Telephony

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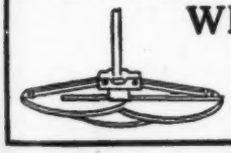

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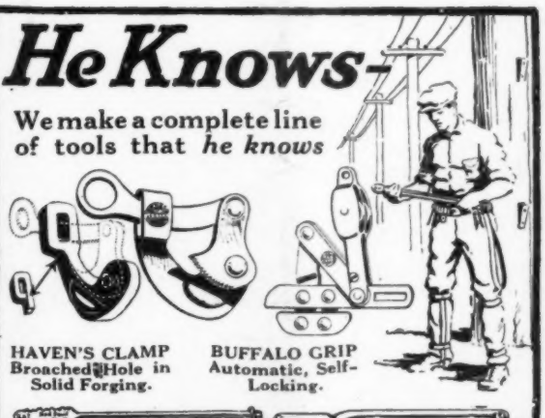

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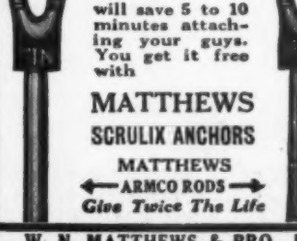

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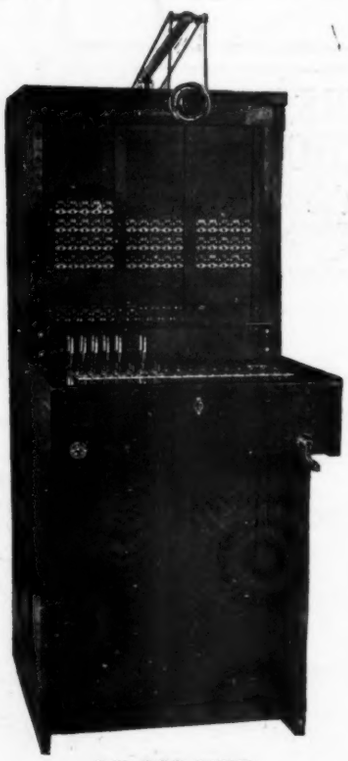

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

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A Merited Recognition.

The federal administration at Washington has accorded the Independent telephone interests marked recognition in designating A. F. Adams to take charge of the Postal Telegraph-Cable Co. Primarily, of course, the honor goes direct to Mr. Adams, but his long connection with the Independent industry inevitably enables that industry to share this recognition, and we have no doubt he is not only willing but glad to divide the distinction with the business in which he has played so important a part.

Mr. Adams will retain his position on the Operating Board of the United States Telegraph & Telephone Administration, it is announced, and this will be good news to telephone men who are familiar with the important work he has done since government control began. His services have been valuable not only for the government, but for the telephone companies, in that he brought to the task an expert knowledge of the business in all its angles.

The Postmaster General made this latest move because of a dispute with the Postal company over its compensation contract. It is understood that Mr. Adams is not concerned with this controversy, and that his plans are confined to protecting and maintaining the property and the service. He will, of course, see that the government's orders are carried out, but his chief intention is to insure the giving of adequate service.

The Postal organization is fortunate to have a man of A. F. Adams' caliber in charge of its property at this time, as his record shows that he stands for constructive policies.

Fix Those Rates Now!

With all possible emphasis Telephony again directs the attention of Independent telephone companies to the fact that now is the time for them to get their rates adjusted to meet the new conditions now prevailing.

Before the government turns back the properties, every telephone company which needs a higher rate should file its application with General Supervisor MacKinnon, so it may get before the Operating Board for action. It makes no difference whether the company has a compensation contract with the government or not, the applications for approval of increased rates should be filed without delay.

Furthermore, it would be well if the Independents take some definite organized action along this line. A comparatively few scattering applications have been sent to Washington, but this movement should be on a more comprehensive scale. It is understood that the Bell interests are proceeding along a well-defined, comprehensive policy, preparing to adjust their rate needs in a thoroughly organized manner. Similar action should be taken by Independent companies, working together either through state associations or in territorial groups.

Rising costs have come, and so far there is no indication they will be reduced much very soon. To take care of these increased expenses, higher rates are needed, *and the opportunity to get them is here right now.*

Court injunctions against the authority of the federal government to raise rates received another body blow when the Massachusetts case was decided in favor of the Postmaster General. In the light of such developments, common sense demands that all companies needing higher rates should lose no time in making ap-

There is a disposition among the Republican leaders of the new Congress to provide some sane, business-like treatment of the railroad situation, and it is quite possible that any such legislation would include the telephones and the telegraphs.

A further possibility is that the wires may be taken from the Postmaster General and placed under the control of the Interstate Commerce Commission. This might take the form of an extension of control—the wires going with the railroads—and would lead to some sort of government regulation which would furnish better protection to the companies. At least, such a plan would do away with the nagging of utilities by state commissions at odds with Washington.

Whatever happens, however, now is the time for telephone companies to have their rates adjusted to meet the rising costs. No more time should be lost. Representatives of big and little companies should get together and formulate an organized, comprehensive plan to take care of this situation. They should strike while the iron is hot, and not delay until the golden moment has passed.

Puts Mackay Out of Postal System

Burleson Deposes President, Secretary, Counsel, Directors and Owners of Postal Telegraph-Cable Co.—A. F. Adams, Prominent Independent Man, Placed in Charge—Officers Accused by Burleson of Obstructing Government Control of Lines

A. F. Adams, president of the Kansas City Home Telephone Co. and a member of the Operating Board of the U. S. Telegraph & Telephone Administration, was appointed by Postmaster General Burleson last Saturday, March 22, to supersede the officers of the Postal Telegraph-Cable Co.

On the ground that the chief officials of the Postal Telegraph-Cable Co. had refused, or failed, to follow instructions, had tried to embarrass and discredit government control and had failed promptly to put a new wage schedule and the eight-hour day into operation, Postmaster General Burleson issued an order deposing Clarence H. Mackay as president of the company, and W. W. Cook as general counsel, and William J. Deegan as secretary.

Mr. Adams, accompanied by C. M. Bracelen of the legal staff of the U. S. Telegraph & Telephone Administration, and Union N. Bethell, chairman of the Operating Board, served the order and took possession of the offices of the Postal company at 253 Broadway on Saturday.

Charles P. Bruch, third vice-president of the Postal company, became the active head of the property by direction of Mr. Adams. Mr. Mackay, Mr. Deegan and Mr. Cook remain as officials of the Mackay Companies, the holding corporation having financial control of the Postal Telegraph-Cable Co.

Text of Official Order.

The order issued by the Postmaster General, which also included the removal of "the board of trustees, directors, and the owners," from all connection with the property, follows:

"Whereas, the president of The Mackay Companies, Clarence H. Mackay; its general counsel, W. W. Cook, and its secretary, William J. Deegan, have failed to carry out the orders and instructions of the Postmaster General and have conducted themselves before the public and with the operating force of said system in such manner as to materially and disadvantageously affect the interests of the government and the operation of this and other telegraph and telephone systems under government control:

"Now, therefore, it is ordered: That Clarence H. Mackay, president; W. W. Cook, general counsel; William J. Deegan, secretary, and the board of trustees or directors, and the owners, are relieved of any and all duties appertaining or incident to the supervision, possession, control, and operation of said telegraph and telephone system, the supervision, possession, control, and operation of which was so assumed by the President in his proclamation of the 22d day of July, 1918.

"And I hereby substitute A. F. Adams for said Clarence H. Mackay, and said owners and said board of trustees or directors in the management of said system, and direct said A. F. Adams to take possession for me of all records, books,

A. F. Adams, President of Kansas City Home Company, Has Been Placed in Charge of the Postal Properties.

and papers, made and used in the operation of said system since midnight of July 31, 1918, and also the net balance or balances of the funds derived from the operation thereof since midnight of July 31, 1918; all officers and employes of the said telegraph and telephone system, except as and in the capacity in which hereinbefore relieved therefrom, will continue in the performance of their present duties, reporting to their respective superior officers and on the same terms of employment as heretofore, the purpose being with respect to this system, as with respect to all other telegraph and telephone systems under government control, so to operate said system as to maintain its integrity and value as a going concern, the efficiency of the organization, and of adequate service to the public."

An announcement by the Post Office Department on March 22, makes this statement:

"In further explanation of this matter, it was stated at the Post Office Department, that the order removing Messrs. Mackay, Cook, and Deegan from the operation of the Postal Telegraph-Cable Co.'s land lines under government control is made necessary by the fact that since the Post Office Department refused to grant that company the compensation asked for by them the officials have refused to follow out the instructions of the department in the management of the properties, and failed to put into operation promptly the wage schedule and the eight-hour day, and in various ways endeavored to embarrass and discredit the government operation of the wires.

The reason for the refusal of the department to grant the compensation asked for was that the sworn statement, submitted to the Interstate Commerce Commission in behalf of the company, placed the net income for 1917 at $117,264, while the sworn statement they made to the wire control board as a basis for compensation placed the net income for the same year at $4,485,593.34.

The value of the plant and equipment of the Postal Telegraph-Cable Co., sworn to in the company's returns to the Interstate Commerce Commission for 1916, was $6,647,472, but the officials of the company declined to make any statement of valuation to the wire control board, although they were repeatedly requested to do so.

Mr. Adams presented this order to Mr. Deegan, secretary of the company, this morning, Mr. Mackay not being in the office, and took charge."

Investigation by Congress.

The action taken by the Postmaster General is said to have served to stiffen the determination of opponents of Mr. Burleson in both the Senate and the House to demand a thorough investigation of the Post Office Department by the incoming Congress. A strong movement is on foot to get the wires out of control of the government with as little delay as possible, and senators and congressmen are not attempting to keep that fact a secret.

Mr. Adams has been connected with telephone work since 1897 when, at the age of 16, he became troubleman for the Waushara Telephone Co. in Berlin, Wis. His rise in the telephone field has been steady ever since. He was associated with a number of Independent companies in Wisconsin and Illinois and in 1905

phone Co., at Joplin, Mo., under Theodore Gary.

About a year ago Mr. Adams became president of the Gary properties, of which the Kansas City Home Telephone Co. is a part. He is considered one of the most capable telephone men in the business.

Court Holds Government Can't Be Made Defendant.

The full bench of the Massachusetts Supreme Court on March 22 dismissed a petition of the Massachusetts Public Service Commission against the New England Telephone & Telegraph Co., by which the commission sought to compel the company to cancel toll rates ordered by Postmaster General Burleson and to return to the schedule in effect prior to January 21. The court held that the United States was a party involved and could not be sued.

The opinion, which was written by Chief Justice Rugg, said that it was "a fundamental principle of law that the United States, like all sovereigns, cannot be implicated unless it consents to be sued."

"We are aware of no statute," the court said, "whereby the United States has consented either to become a party to rate fixing proceedings before the public service commission or before this court.

"It is the contention of the attorney general in behalf of the public service commission that the resolution of Congress of July 16, 1918, reserved to the states the right to regulate intrastate rates to the same extent as that power existed before federal control. That contention is founded upon the final clause of the resolution. That proviso does not seem to us reasonably susceptible of being stretched by implication to include a consent to be impleaded in the state courts in such a proceeding as this. Such consent is not commonly inferable from such remote and equivocal phrase having direct and adequate reference to another matter.

"Therefore, it appears to us unnecessary to consider or discuss the merits of the question whether the proviso of the resolution of July 16, 1918, under its reservation of 'lawful police regulations of the several states,' justifies rate regulation by a state in the exercise of its police power because we do not reach it."

Circuits With Zero Mutual Induction

Reduction of Inductive Interference in Telephone Circuits—Forms of Constructions and Calculations and Tentative Designs for Greatest Refinement of Balance Against Induction—Paper Before American Institute of Electrical Engineers

By William W. Crawford

I. General.

The method of transposition as applied at present in telephone practice involves balancing against each other fairly large inductive effects in adjacent sections of the circuits. Harold S. Osborne

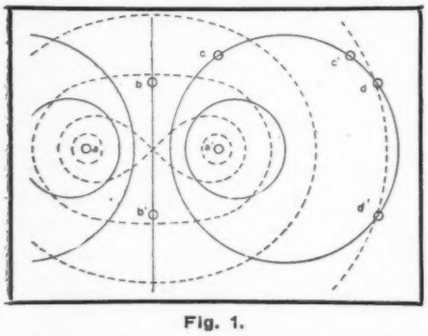


Fig. 1.

has in a recent paper[1] named various influences which render it impossible to make the opposing effects completely annul each other.

By proper design the residual unbalances are ordinarily reduced to a point which gives satisfactory operation. The design of the transposition system is, however, subject to severe limitations in the case where the telephone line is to parallel electric power circuits. Particularly, it is difficult to obtain proper coordination between the transpositions in the telephone circuits and the points where changes take place in the degree of exposure to power circuits.

There are certain relative positions of two or more circuits composed of parallel wires, in which the electrostatic and electromagnetic co-efficients of mutual induction are continuously zero. Between circuits so positioned not only should the residual effects disappear, but there should be no need for transposition.

It seems worth while to inquire how far the employment of such arrangements will go toward giving greater refinement of balance, increasing the flexibility of design, and rendering usable for telephone leads locations which are not permissible in present practice. The idea involved is a very old one[2], and the aim of this paper is to show that it has certain merits in connection with modern practice which it did not have before the advent of the phantom circuit.

In Fig. 1 the solid lines represent the electrostatic equipotential surfaces due to equal and opposite charges on the parallel wires, aa'. Placing the two wires of the circuit, cc', in the same equipotential surface as shown, subjects both wires to the influence of the same potential; there is no tendency to induce a current around the circuit cc'. If, however, a and a' have like charges, the equipotentials are as shown by the dotted lines; c and c' are unequally affected.

A like situation arises with respect to electromagnetic induction. The lines of magnetic force due to a current out a and back a', or vice versa, follow the same curves as shown by the solid lines in Fig. 1. For such currents there is no mutual inductance between aa' and cc'. But for currents travelling in the same direction along a and a', the lines of force follow the dotted curves, they link between c and c', and induce a current around that circuit.

The voice currents in the physical circuits travel around the circuits, but the phantom voice currents, and some classes of stray currents due to induction from outside sources, travel along both wires in the same direction. Therefore, the arrangement of Fig. 1 would tend to eliminate cross-talk between the physical circuits aa' and cc', but not cross-talk between these circuits and a phantom set up on them, nor the tendency of stray lengthwise currents in one physical circuit to render the other physical circuit noisy. The latter effects are removed by transposing both circuits alike.

The same is more or less true of every mutually non-inductive relative position

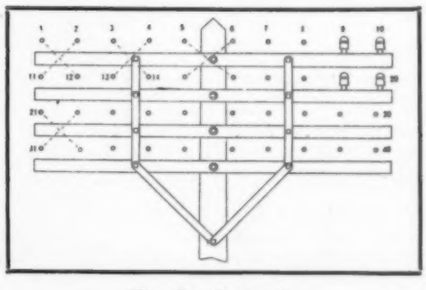


Fig. 2. Form A.

of the two circuits except that shown by aa' and bb', Fig. 1. Wires bb' lie in the same electrostatic equipotential, or link zero flux, for either like or unlike charges or currents on aa'. The circuit aa' is

[1] Proceedings A. I. E. E., July, 1918.

[2] See A. V. Abbott, Electrical Transmission of Energy, 1898, Art. 52.

also balanced for currents or charges in *bb'*. A circuit in the position *dd'* is balanced with respect to *aa'*, but *aa'* is only partially balanced with respect to *dd'*.

If a phantom is set up on the circuits

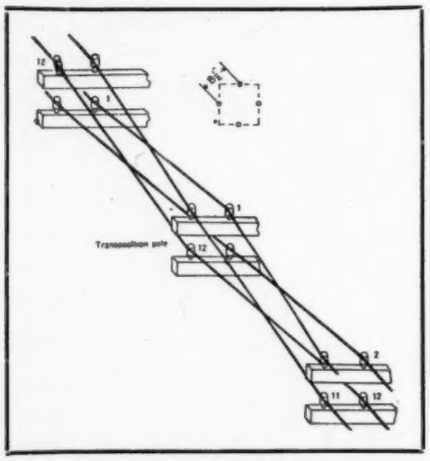


Fig. 3. Physical Transposition.

aa' and *bb'*, the phantom is very nearly immune from external fields. The average effect of an external field on wires *a* and *a'* will approximately balance that on wires *b* and *b'*, unless the field is very nonuniform. There is, moreover, no mutual induction between the phantom and its own side circuits—a marked contrast to present standard practice.

The above statements are inaccurate to the extent that the affected wires may have unequal capacities to ground, so that equal potentials induce unequal charges, and that the electrostatic field is distorted by the presence of other wires on the lead, which behave as if grounded. Consequently, there is no single relative position which will in all cases give perfect balance for both electrostatic and electromagnetic effects. Such transpositions as are necessary for other reasons are sufficient to eliminate also these effects.

II. Application to Complete Leads.

The practicability of applying the proposed group arrangement in practice will be discussed in terms of the forms of construction shown in Figs. 2 to 9, inclusive.

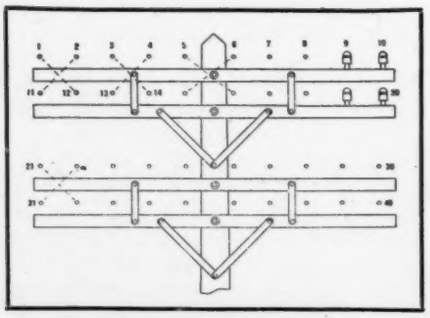


Fig. 5. Form C.

In form *A*, Fig. 2, the cross-arm spacing is made equal to the pin spacing. Wires 1 and 12 form a physical circuit, as do the wires 2 and 11; all the other wires are arranged in similar groups. There is a considerable mutual induction between wires 1-12 and 4-13, also between 2-11 and 3-14. Between 1-12 and 3-14, 5-16, etc., there is an approach to the same relation as between *aa'* and *cc'*, Fig. 1.

There being no necessity of transposing the two physical circuits of a group relatively to each other, each group is treated as a unit in transposing relatively to the other groups. Special insulators or pins are not necessary to make a transposition. The wires are merely rotated around the quadrangle, for example, 1 replacing 2, 2 replacing 12, 12 replacing 11, and 11 replacing 1. For a physical transposition this rotation is continued in two spans, whereupon the two wires of each circuit are interchanged, see Fig. 3.

As shown in Table III, there is some mutual inductance between phantoms, though this is smaller than it is in the present system, and falls off much more rapidly with distance. The amount is sufficient to require transposition of the nearest phantoms. For a phantom transposition, the wires are rotated in only one span. This method of transposition is the same as that now used in polyphase power circuits.

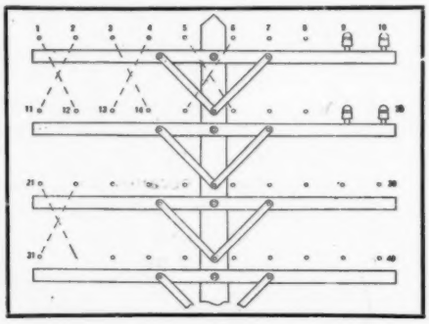


Fig. 4. Form B.

At the center of the span, the distance between the wires is reduced to $1/\sqrt{2}$ of its value at the poles, see dotted square in Fig. 3.

If existing cross arms are used to construct form *A* or *C*, the central group is not quite equilateral, there being a greater space between the pole pins. The chief effect of this distortion is to introduce into this one group a mutual inductance between the side circuits, about equal to that between a phantom and each of its side circuits in present practice, see Tables I and III. The phantom transpositions, by interchanging the pin positions of the side circuits, balance out this mutual inductance. Considerations of type unbalance between the side circuits may require transposing the phantom of this group to a pattern having more frequent transpositions than would be required for the benefit of the phantom alone.

In form *B*, Fig 4, the use of present standard cross arm spacing, as well as standard pin spacing, is contemplated. The only alteration required to convert a present type lead into form *B* would be to re-transpose, and re-connect the jumpers at the ends of the line. The mutual inductance between the side circuits, and the susceptibility of the side circuits to external induction appear, however, to be prohibitive, see Tables II and VII.

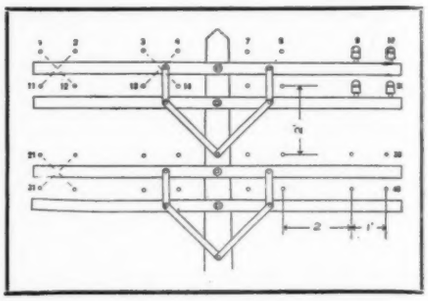


Fig. 6. Form D.

Form *C*, Fig. 5, resembles form *A* except that the distance between the various horizontal rows of groups is increased, giving electrical characteristics somewhat better than form *A*, and better accessibility of the wires.

In form *D*, Fig. 6, the aim is to provide still better conditions as to freedom from induction. The unsymmetrical center group is removed, and the spacing between the other groups is increased.

Form *E*, Fig. 7, is obtained by adding to a lead, constructed in accordance with present practice, four pairs of wires per cross arm, the added circuits being supported in vertical planes on special duplex pins or brackets. The necessity of having the lower wires clear the cross arm makes the groups unsymmetrical, but without introducing mutual inductance between the side circuits. The other inductive relations are affected as shown in Table I. The pole-pin wires may be reserved for non-phantomed circuits, or phantomed by the method now in use.

One or more form *E* groups may be incorporated in a lead which is otherwise standard, giving proper attention to the co-ordination of the transpositions of the two different styles of construction. The form *A* group may also be constructed with duplex pins or brackets, in which case it becomes feasible to use this form in the same way as the form *E*.

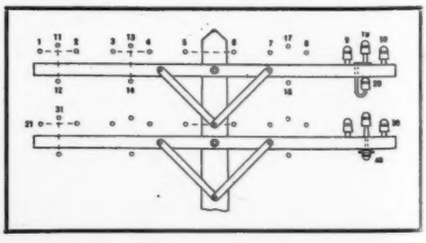


Fig. 7. Form E.

Form *F*, Fig. 8, is an idealized form *E*,

in which the groups are symmetrical. Form *G*, Fig. 9, bears the same relation to form *F* that form *D* does to form *A*. On account of the small clearance between wires in form *F*, and *G*, standard

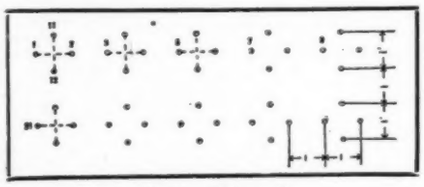


Fig. 9. Form G.

cross arms cannot be used, and some special form of construction would have to be devised.

Certain other designs, in which the form *A* group is alternated with the form *E* group, or in which the different horizontal rows of groups have different spacings, give zero mutual inductance between some of the adjacent phantoms. The possibilities presented by these designs have not yet been fully worked out.

III. Comparisons.

In comparing the susceptibility to induction of the various forms it has unfortunately been possible to take account only of the mutual inductance, and not of the capacitance unbalances, because of the great labor required to compute the latter. Probably the two effects will vary nearly enough in the same proportion, as between different forms, so that the comparisons on a basis of inductance alone, if used with due caution, will not give false conclusions. Values of mutual inductance are given in Tables I, II, and III.

In form *A*, the maximum value of mutual inductance (that between circuits related like 1-12 and 4-13) is about equal to that between a phantom and one of its own side circuits, or between two vertically adjacent horizontal type phantoms, in present practice. Each physical circuit other than the pole-pin circuits in form *A* has two or three such relations.

The pole-pin circuits have one additional large value. In the standard form, the large value comes only once into each physical circuit, but three or four times into each phantom, except the pole-pin circuits and phantom. Form *A*, therefore, decreases the induction between phantoms at the expense of the physical circuits.

In form *C*, the maximum value of mutual inductance is the same as in form *A*, but this value occurs less frequently.

Forms *D*, *F*, and *G* give, on the whole, a very great reduction in mutual inductance. Forms *F* and *G* are interesting from the large number of values of zero mutual inductance which they afford. Most of these are due to the relation *a a'* to *d d'*, Fig. 1.

Form *E* has a large value of mutual inductance, about equal to that in the standard form, which comes once into each phantom, and once each into half the side circuits.

A summation was obtained of the inductive effects on each circuit of all the other circuits (Table IV and V), showing that the phantoms in the proposed forms are on the average about one-tenth as sensitive to cross talk as are the side circuits. In the standard form the phantoms are twice as sensitive as the side circuits. Although the sensitivity of the side circuits is increased in form *A*, the reduction of the sensitivity of the phantoms is sufficient to make the average for all circuits less than in the standard form, despite the fact that in form *A* a given number of circuits are compressed into half the normal space.

Such a compression of the standard form would result in considerable increases in the mutual inductance values, with consequent increase of the sensitivity to cross talk. In form *C* the sensitivity of the side circuits is about the same as in the standard form, the improvement of the phantoms is clear again. In the other forms, the sensitivities of side circuits as well as phantoms, are decreased.

Corresponding figures (Table VII) for the sensitivity to induction from power circuits show a similar result. In forms *A*, *C*, and *D*, the sensitivity of the side circuits is increased because in these forms the distance between the two wires of a side circuit is $V\,2$ times what it is in present practice. The sensitivity of the phantoms is, however, negligible, except when the disturbing circuit is very close to the telephone circuit.

On account of the shorter average distance between the wires in a group in the proposed forms, it is to be expected that the effect of accidental displacements of the wires from their correct positions will be greater than in standard practice. The unbalance produced will in each case be greatest between the circuits forming one group, and the comparison is made only on the basis of such circuits. (Table VI).

For horizontal displacements, the various forms have nearly the same sensitivity as standard construction. Horizontal displacements should be rare, because the horizontal spacing is fixed by the pin locations.

The effective vertical spacing depends on the sag, and this is likely to vary. For displacements as small as the value assumed for comparison (root-of-mean-square displacement, 0.1 foot, or 0.3 meter) the effect is practically nil in the standard form, but in all the proposed forms, it is appreciable. This is a distinct disadvantage, the importance of which can be determined only by the aid of data from actual construction.

Comparison with the values in Table V appears to show that unless the r. m. s. value of displacement is considerably greater than the value assumed, the total unbalance due to these displacements will not be more serious than the unbalance which occurs in standard practice due to the transpositions being located at the nearest poles, instead of at the theoretically correct points. The tendency of the proposed forms being to reduce the effect of inexact location of the transpositions, the total effect of all irregularities should not be much greater than in present practice.

Keeping the cross arms carrying wires in the same groups accurately parallel is evidently essential in forms *A*, *C*, and *D*, the method of bracing illustrated in these forms is intended to provide for this.

The effect of displacements of the wires on the induction from power circuits is the same in the proposed forms as in the standard form.

Number of Transpositions and Number of Transposition Patterns. Certain comparisons are fairly obvious between the number of transposition patterns (types) and the total number of transpositions required in the standard and proposed forms.

The condition of zero mutual induction between a phantom and its side circuits does not mean that the three circuits can be transposed after the same pattern. If that were done, each time a side circuits reversed, it would move to the other pin position, for a given pin position it would always have the some polarity, it would not be balanced with respect to external induction. This fact is exemplified in the standard *E*-section in circuits 5-6 and 15-16, which have zero mutual inductance with the phantom, nevertheless, they are transposed to different patterns from the phantom (Table IX).

If each circuit is to have its own transposition pattern, 30 patterns are required for the commonly-used physical and phantom circuits on the first four arms in the standard form. In the proposed forms, each pair of side circuits being transposed as a unit, only 20 patterns would be required.

In the *E*-section, 16 types of transposition pattern are used, and mutual inductance and capacitance unbalances as large

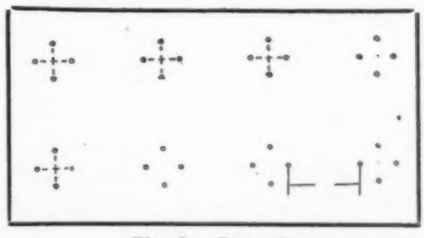


Fig. 8. Form F.

as 5.44 microhenries per kilometer, and 3.0 micro-microfarads per kilometer, respectively, are allowed. Adopting these limits for the proposed forms permits a still further reduction in the number of

patterns, and in the number of transpositions, required.

The effect of simultaneous phantom transpositions in two groups is to reverse the mutual inductance between the circuits whose planes are at right angles, like 1-12 and 4-13, Figs. 2, 5, or 6. Only the circuits related like 1-12 and 3-14 are left unbalanced, and the mutual inductance between these is small. Whenever the mutual inductance of two phantoms is small enough so that they can be transposed to the same pattern, the same is true of the physical circuits.

Fig. 10 shows a transposition system which utilized this fact. Four types of group transposition are used, denoted by I, II, III, IV. There are only 16 transposition poles per section. The procedure in design was as follows:

Physical transpositions were inserted in all the groups at the odd-numbered transposition poles, balancing the physical circuits for outside induction every eighth section. Next, phantom transpositions were inserted at the poles 2, 6, 10, and 14. This balances the phantoms every quarter section for sources of induction which are too near for the phantoms to be immune due to their form.

As already stated, these phantom transpositions greatly reduce the unbalance between physical circuits. Poles 4, 8, and 12 remain for balancing out the induction between phantoms and the residual induction between physical circuits in the four groups. Only two phantom types are used, leaving the diagonally adjacent phantoms untransposed. It is then possible to obtain complete balance of the four adjacent pairs of physical circuits. There are several ways of doing this, one of which is shown. It is also possible to balance the four phantoms, leaving a slight residual unbalanced in the diagonally adjacent pairs of physical circuits.

The largest values of unbalanced mutual inductance in Fig. 10 are as shown in the accompanying table.

The inductance unbalance is within the limit even for form *A*. The limiting value of capacitance balance in the *E*-section, however, occurs between circuits which are separated by a large number of intervening wires, the screening action of which has a large effect in reducing the capacitance unbalance. There will be very little screening action between the diagonally adjacent groups in the capacitance unbalance between the diagonally adjacent phantoms will be much too large if Fig. 10 is used. In other forms, however, the inductance unbalances are so far below the limit that it is probable that the capacitance unbalances are not excessive, and Fig. 10 can be used.

Form.	A	C	D	F	G
Diagonally adjacent groups—					
Phantoms	4.77	0.76	0.93	1.17	0.23
Alternate groups in the same horizontal row—					
Phantoms	1.17	1.17	0.23	0.29	0.06
Physical circs.	1.55	1.55	0.31	0.40	0.08

Limits in the standard E-section.
Inductance unbalance, 5.44, capacitance unbalance, 3.0.

The Largest Values of Unbalanced Mutual Inductance in Fig. 10.

Fig. 11 shows a system in which the mutual inductance between the diagonally adjacent phantoms is eliminated. The method of design was the same as in Fig. 10, except that physical balance was obtained between horizontally and vertically adjacent groups at the outset, giving the necessary added flexibility to permit transpositions on poles 4, 8 and 12 to completely balance the four groups.

In this case, the maximum unbalance is between alternate groups in the same horizontal row. Fig. 11 is apparently suitable for use with form *A*. By using a slightly larger number of transpositions, with the same number of transposition poles, non-adjacent groups can be completely balanced if desired.

The extension of Figs. 10 and 11 to more than 40 wires is a matter only of repeating the same system, additional transposition poles are not necessary.

These designs were not obtained by a systematic study of all the possibilities but rather, by a logical process from the the proposed forms, hence, in form *A* assumed conditions, to which method the proposed form of construction appears to be favorable. The designs are of a tentative nature, and are intended merely as illustrations of the possibilities of the proposed forms.

In standard practice, a distinction is drawn between the effect of distant and near disturbing circuits, on account of the effect of the phantom transpositions in shifting the pin positions on the physical circuits. In Figs. 10 and 11, this effect does not need to be considered, since each section of physical circuit between two phantom transpositions is completely balanced for external induction. The distinction between near and distant circuits is in the proposed forms based on the phantoms, the balance of which with respect to distant circuits is not dependent on transpositions.

The permissible locations for discontinuities of the telephone lead depend a good deal on the form of construction. For example, a form *D* lead transposed by Fig. 10 or 11 could be discontinued at a half-section, or even at a quarter-section point, with only a very slight resultant unbalance.

Provision for Non-Phantomed Circuits.—Where non-phantomed circuits occur in pairs, they may be treated in the same manner as phantomed circuits, except, possibly, in the case of circuits which have transmitters of large output, in which the unbalance due to sag variations may make it undesirable to associate the circuits in groups of the proposed form. Each single non-phantomed circuit will have to occupy the space appropriated for a group. If there are only a few such

(*Continued on page* 32.)

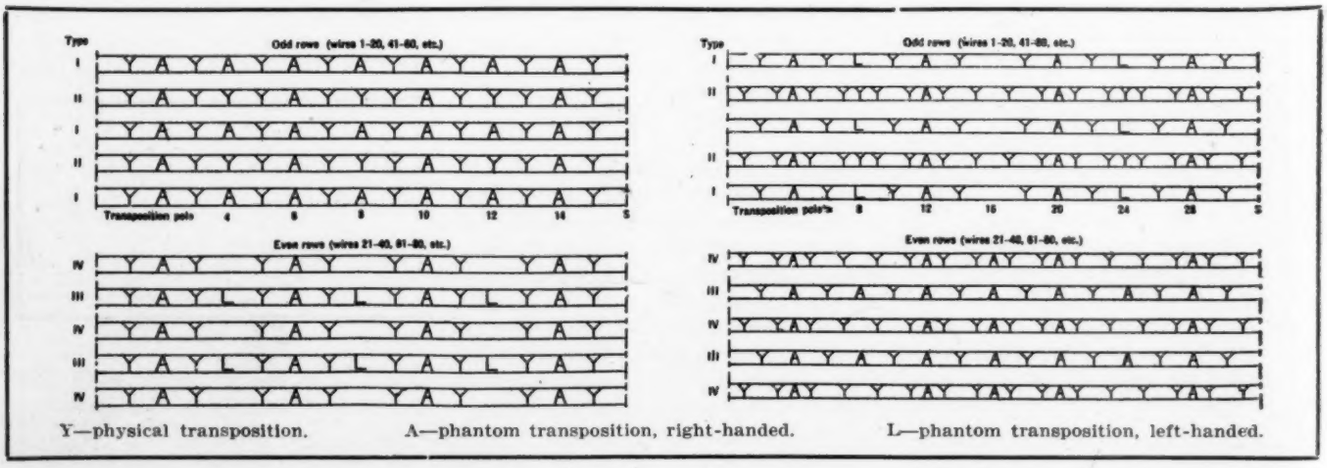


Fig. 10. Fig. 11.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

1171. What is the lowest number in the two-digit automatic system? How is the bank contact of this line reached by the switch wipers? What is the highest number in the two-digit automatic system (considering the number as representative of the number of steps that must be taken by the wiper shaft to reach its bank contacts)? How many impulses of current pass over the calling telephone line circuit when the number 57 is being called (in a two-digit system)? How many when the number 00 is being called (in a two-digit system)? In the two-digit system what does the first digit represent? What does the second represent?

1172. What is the actual meaning of 0 in automatic switching? How many rotary steps are required to drive the wiper shaft to the last contact in any given row of bank contacts? What is the ordinary use made of the lines that would be represented by the bank contacts in the top row?

1173. How is the capacity of the automatic office increased beyond the capacity of one contact bank? Explain how another "selection" is interposed between the banks of the line switches and the wipers of the connector switches in order to increase the capacity of the office above 100 lines? What is the difference in the operation of the connector switch and the selector switch interposed between the line switch and the connector as shown in Fig. 292? How many accessible line circuits are represented by one row in the intermediate selector banks in the three-digit automatic office?

1174. What are the rows called in the banks of the intermediate switches interposed between the line switch and the connector when the office has a capacity of 1,000 lines? Explain how the selector switch wiper moves when calling 794?

1175. What is the first selector? How is the wiper of the first selector driven into the selected row of bank contacts?

CHAPTER XXXII. Mechanical Switching (Continued).

1176. *Grouping effect of introduction of first selector.*—It is obvious, on the most casual consideration of the matter, that the introduction of a first selector switch into the trunk between line switch banks and connector switch wipers will modify the factors dependent upon the trunk grouping arrangement.

For any given total office busy-hour traffic the number of trunk circuits required between the line switch bank and the first selector wipers is determined, as in the case of connector switches in 100-line capacity exchanges, by the traffic conditions in the group of lines served. It is obvious, however, that every first selector switch wiper in the three-digit exchange must have access to any connector switch, in order that calls for any one of the exchange lines may be completed.

In other words, all connector switch wipers must be represented in each first selector switch bank by a set of bank contacts. This means that, instead of ten separate groups of connector switches, one group for each group of 100 lines, there is one large group of connector switches, accessible to any calling line, to serve the entire exchange and that this one large group must handle all the traffic *incoming* to the entire office of 1,000 lines. Obviously this is the entire traffic in a single office exchange.

A very brief consideration of the two curves shown in Figs. 266 and 270 will make it plain that fewer connector switches are required for one office of 1,000 lines capacity than for ten offices of 100 lines capacity each. This is the direct result of the interposition of the first selector switch between the line-switch banks and the connector switch wipers.

It is due to the fact that such an arrangement increases the number of connector switches in one group with a corresponding increase in the busy-hour capacity of each one.

To put this condition another way, it will be remembered that each first selector switch bank contains contacts wired to all the connector switches in the entire office. All the traffic of the entire office *must* filter through this one group of connector switches before it can reach the line, in the case of each individual call, for which it is destined.

1177. *Traffic flow.*—If it will be remembered that the traffic handled through the connector switches is *always in the same direction,* it will be very obvious that all the connector switches in the three-digit system are in one large traffic handling group. This is true regardless of the fact that they are also divided into groups corresponding to the groups of 100-line circuits served by each switch into which the office is divided.

At the same time, should it happen that the traffic directed to individual groups of 100 lines is continuously heavier than that directed to others, it would be necessary to reduce the total number of lines in the same group, increase the number of connector switches serving it, or change some of the lines showing the heavy incoming traffic into other groups. This latter expedient is the sole possible solution when the maximum number of connector switches has already been allocated to the group.

In addition to the considerations outlined, it is also necessary to remember that the individual levels of the first selector bank represent, in each case, the channel through which a group of 100-

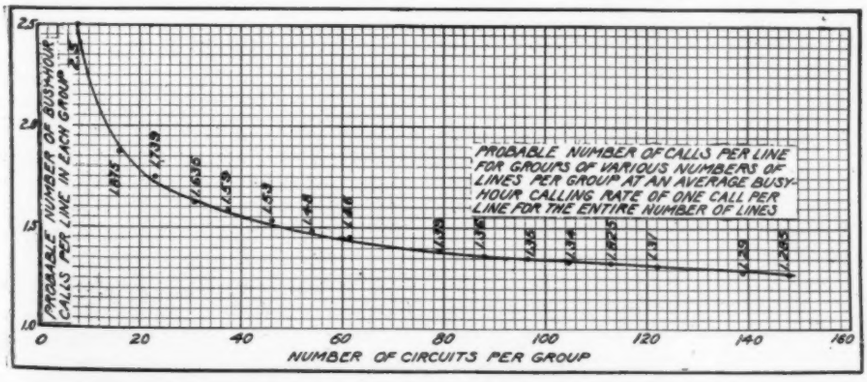


Fig. 266. Relation Between Calling Rate and Number of Circuits Per Group.

line circuits may be reached by incoming calls. The traffic consideration, therefore, so far as the trunk circuits between the first selector banks and the connector switch wipers are concerned, is to provide a sufficient number of trunks in each level to serve the lines reached through that particular level.

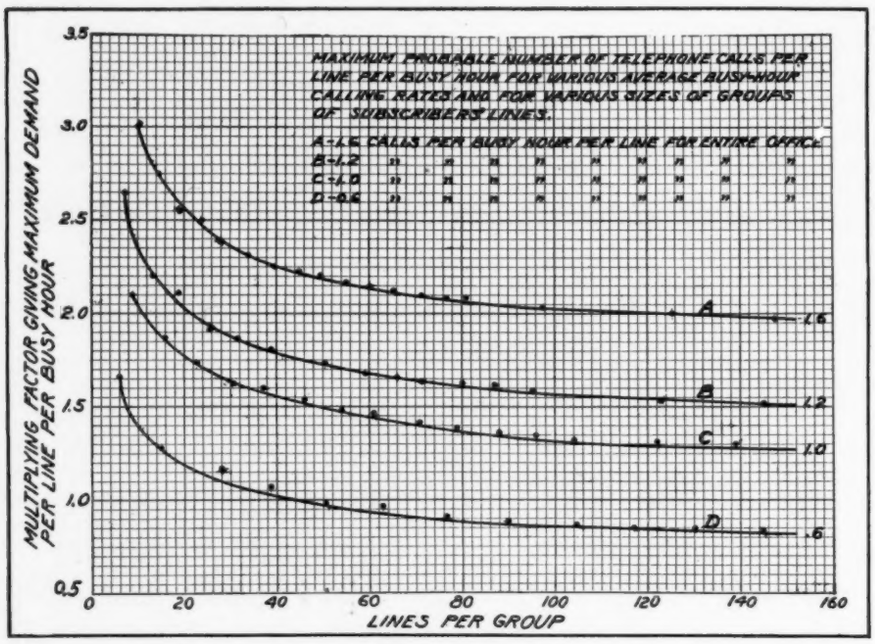


Fig. 270. Curves for Various Average Busy Hour Calling Rates.

At the same time it is necessary to provide a sufficient number of trunks between the line switch banks for each line group and the first selector switch wipers to handle the traffic originating in the line switch group served.

1178. *Comparison with manual equipment.*—In comparison with manual equipment it becomes evident that the automatic trunking system corresponds to the transfer trunk system of handling traffic. The calls reaching the connector switches are *always* proceeding *to* the called line circuit just as the calls handled by the second or *B* operator of the transfer manual switchboard are intended for delivery to the called line circuit; in fact, the line switch corresponds, in many ways, to the answering cord and plug of a transfer manual switchboard while the connector switch corresponds, in many ways, to the calling plug and cord.

Many switchboard systems have been developed, from the theoretical standpoint, in which the manual cord and plug are combined with the mechanical method of selecting the cord or trunk circuit used. This is done on account of the undoubted great flexibility of the cord and plug.

1179. *Practical methods of assuring capacity.*—It is customary to provide arrangements by means of which the number of switching units, within the maximum limit, may be utilized if needed. For instance, each level in the first selector banks contains ten sets of bank contacts representing a possible maximum outlet of ten trunks.

The traffic into the line group served by the connector switches terminating this group of ten trunk circuits, assuming that the system in question is a three-digit system, may require only six trunks and connector switches.

If this is the case, only six need be installed with the full wiring between the first selector banks and the connector switches in place. Should it develop that the traffic is so heavy as to require the installation of additional trunks, the switches may be added to the wiring already in place until the maximum number has been installed.

(*To be continued.*)

Wireless Telephony from United States to France.

One-way wireless telephone conversations were held between the naval radio station at New Brunswick, N. J., and the American transport George Washington throughout her voyage from New York to Brest.

The messages were sent from the station at New Brunswick, which belonged to the Marconi Co. before the war but which was taken over by the government and has since been under naval operation.

The George Washington received wireless telephone messages and replied to them by wireless telegraph, not having a wireless telephone apparatus for sending wireless telephone messages over long distances. One of the messages sent by wireless telephone to the George Washington was from Secretary Daniels. President Wilson listened to the wireless words of Mr. Daniels but was unable to reply vocally.

The fact that these one-way conversations from New Brunswick to the George Washington, even after the steamer reached Brest, were held was confirmed at the Navy Department on March 20 by Commander S. C. Hooper of the radio branch of the Bureau of Steam Engineering and other naval officers.

The apparatus used in sending the messages to the George Washington is the invention of E. F. Alexanderson of the General Electric Co. of Schenectady, N. Y., who had charge of the tests which the navy ordered made at the New Brunswick station during the President's voyage. After the government took over the Brunswick station it installed the General Electric Co.'s system, which was used with a device known as the Alexanderson alternator for sending the messages. That they were plainly heard was confirmed in radio messages from the transport.

The wireless telephone messages between New Brunswick, N. J., and the steamship George Washington at Brest, France, covered a distance of approximately 3,200 miles, the greatest distance yet covered by the wireless telephone by several hundred miles, Mr. Alexanderson stated. He began experimenting for the General Electric Co. at New Brunswick about two years ago, but before much progress could be made the government took over the plant for wireless telegraph communication with France. When the President decided to go abroad the experiments were resumed and the apparatus brought to its present state.

Mr. Alexanderson believes that commercial wireless telephone service will soon be established between all the principal cities of the world. The features of his invention making long-distance telephoning possible are, according to Mr. Alexanderson, his high frequency alternator, known as the Alexanderson alternator, which provides a more efficient way of generating electric waves, and his new magnetic amplifier, which transforms telephonic currents to high-power electric waves. He also has a new antenna which is several times more efficient than any previously used.

"We have no reason to believe that 3,200 miles is the greatest distance we can now send messages," said Dr. Alexanderson, "but at present we have no other means of making a greater test. The receiving apparatus on President Wilson's ship is the only one that can be used at present. We expect to make longer tests soon."

A feature of the apparatus at New Brunswick is that it can be used for either wireless telephone or telegraph messages without alterations. This is impossible with other instruments, Dr. Alexanderson says.

It was in 1911 that the first experi-

ment was made for the transmission of telephonic speech by the magnetic amplifier, the invention of Dr. Alexanderson, between Schenectady, N. Y., and the College of the City of New York. These tests were continued for five years without developments sufficient to warrant extending them to a greater distance. In 1918 the General Electric removed the experimental station from Schenectady to the New Brunswick station, where its apparatus was utilized by the government.

The first inkling that Dr. Alexanderson had returned and completed his experiments came with the announcement that on President Wilson's first return from France Secretary Daniels talked over the regular telephone from Washington to New Brunswick and then by wireless telephone to the President while his ship was still 700 miles at sea. Then followed the sending of wireless telephone messages daily throughout the President's second trip to France from New York to Brest.

Thirteen poles, each 400 feet high, make the New Brunswick plant conspicuous. Otherwise the two-story brick building would appear as any power house.

Some News from Across the Seas

Authorities Concerned with Demoralization of Telephone Service in Great Britain—Postmaster General to Ask for Grant of $40,000,000 to Be Expended During 1919 on Construction of New Lines and Exchanges—"Multiplex" Wires

By Jack Brooks

[EDITOR'S NOTE.—The name, Jack Brooks, with which most of TELEPHONY'S readers are familiar, has been absent from our pages for some two years, and one may easily surmise the reason—he is in the army. In a letter enclosing the accompanying news notes, Mr. Brooks, who is with Company C, 2nd Battalion, London Scottish, writes:

"Since corresponding with you last, I have been with the battalion in France, Macedonia, the Balkans, Egypt and Palestine, as a Lewis gunner, and have been wounded only once."]

That something must soon be done in London with regard to the demoralized telephone service is foreshadowed by the sudden concern of the authorities who are now fully alive to the seriousness of the situation and to the growing impatience of the public. The announcement, from a high political source, that the postmaster general is to ask the treasury for a grant of $40,000,000 to be expended during 1919 on the construction of new telephone lines and exchanges, is a sure sign of the times.

As is well known to readers of TELEPHONY, the telephone service of Great Britain is furnished by the post office authorities. Ever since the postmaster general took over the service some years ago, telephone troubles and delays have been amazing. During the war, conditions, naturally, have not improved, and charges of abuse in the government in connection with priority calls are now heard on every side.

It seems that the percentage of government priority calls has been exceptionally high over the trunk lines. Indeed, the following figures speak for themselves:

Between London and Glasgow, 86 per cent.

Between London and Manchester, 85 per cent.

Between London and Southampton, 74 per cent.

Between London and Sheffield, 64 per cent.

Between London and Bristol, 65 per cent.

At the time of writing it takes several hours to telephone from London to Manchester—a distance similar to that between Chicago and Indianapolis.

Of course the post office has explanations for the ever-decreasing efficiency of the service. It has 85,000 trained employes, but of this number, it says, 82,000 are either still in the army or passing through the various stages of demobilization. The post office appeals to the military, and the military replies that these men are wanted for the construction and the maintenance of the military wires in France.

As regards a remedy the postmaster general urges cessation of the government abuse in its priority calls, the immediate construction of many new lines and exchanges and the quick release of the trained operators still in the army. Whether the treasury will grant the $40,000,000 remains to be seen.

While the trunk lines seem to be the most demoralized, owing to the government priority scheme, the local exchanges are nothing to "write home about," so far as their efficiency is concerned. This inefficiency is due, in the main, to the inexperience of the staffs.

Considerable space is given to the present condition of the service by the London press, which (not by any means for the first time) goes for the government "baldheaded." Northcliffe's Daily Mail, in an editorial, "The Scandal of the Wires," demands that the government's priority abuse cease at once and that the thousands of post office servants retained by the army be released instantly.

The Daily suggests that a record be kept of all priority calls transmitted, with the name of the official making the call and the nature of the business. These records, the paper suggests, should be examined regularly and frequently by an independent committee with power to act.

The question of privileges given certain private firms so far as priority rights on trunk lines are concerned, is also being raised and may be the source of some interesting revelations.

The telephone service of Britain continues to provide material for people with a well-developed sense of humor. Of the latter category is the subscriber commenting on the multiplex telephone installation from the U. S. A. This Englishmen, who "enjoys" an installation of his own, says the multiplex system which enables one wire to do the work of ten is by no means a new invention.

"My own telephone wire," he explains, "has frequently carried more simultaneous conversations than the one-wire load of this reputed novelty. But we British are a modest people, apt to deprecate our own inventions, and that, I imagine, is why, whenever I have complained of the loquacity of my telephone, the telephone authorities have always explained that it was only 'a contact.'

"Once, when I happened to be the only person in the house, my telephone summoned me from a hot bath to bid me 'send two pounds of the best rump steak to Mr. Blink of the 'Green Man.' While I am trying to explain that I am not a butcher my telephone switches off to a conversation between two women which was so engrossing to me that I quite resented the man whose voice kept breaking in and demanding of me who I was and ordering me to 'get off the line.'

I also heard fragments of another woman's conversation with her doctor begging him to come and see her husband as soon as possible, informing him: 'He has brought it on himself again, doctor, and I do hope that this time you will frighten him.' And all the time I also heard the voices of the operators at what seemed to be about seven telephone exchanges.

"From this I think it will be agreed that the American invention is no invention."

What Is Your Company Doing?

Chats About Company Doings.

By Stanley R. Edwards.

With the war over, the New York Telephone Co. advertises in New York City papers under this heading:

"Now for a Permanent Position—Telephone Operating."

in bold face type. It follows with this phrase:

"An opportunity for the young woman who threw the weight of her hand and mind into the winning of the war and who is now looking for permanent employment."

Then the real appeal is contained in the body of the advertisement as follows:

"While you have been engaged in turning out the things that made fighting possible—while you have been serving in any one of the thousands of capacities in which women contributed so largely to the winning of the war—thousands of telephone operators, 'Soldiers of the Switchboard,' they have been called, have likewise been engaged in tasks that helped to bring about the Great Result.

But while your work is finished, the real work of the telephone operator continues. Her position is as vitally important today as it was during the active days of warfare, and she will need help in carrying on her important duties during the coming period of reconstruction.

So to you bright, healthy, ambitious young women between 16 and 25, who appreciate the importance of serving the public in a big way, we offer employment as telephone operators with good pay while you learn, increased pay at frequent intervals after you learn, and a good desirable position always.

Telephone operating is an occupation in which the workers are promoted to executive positions and your advancement to one of these positions therefore is only dependent upon your willingness and ability.

We are interested in all young women who possess the necessary qualifications and we would be pleased to have them call at any Application Office for particulars."

The board of directors of a small Missouri company decided to ask the co-operation of all members toward improving the service. Large cards were printed and patrons were asked to place one near the telephone and follow as nearly as possible the general directions. Here is what was printed on the card:

"1st. Pay your dues promptly three months in advance. Not to do so weakens our service. No further notice will be given.

2nd. Keep your telephone and individual lines in condition that you may know the cause of bad service is not yours.

3rd. You are expected to collect a fee of 10 cents for each call put through the switchboard by persons not owning telephones. (It is just and right.)

4th. Visiting on commercial lines is limited to five minutes. Telephone lines are not maintained as a social medium.

5th. Avoid ringing on your party line after office hours. It sets off the night bell, causing the operator to get up unnecessarily.

6th. Attend all meetings, thereby assisting to build up the system. Don't stay at home and complain of what others do.

Respect the above rules that we may bring closer fellowship among us."

"What are your qualifications?" asked a man of an applicant for a position. For years, the questioner acted as special business counsel for many of the country's largest organizations. He has successfully measured executives and changed their responsibilities to those for which they were best fitted.

"Why, er—er—er—I—I kind of like to sell things. What do you mean by qualifications'?"

After several attempts to get definite information regarding his basic qualities, the business counsel asked the man: "What are your amusements?" There was no hesitancy at all in the reply. Golf, theater, fishing, dancing, reading and several other amusements were named in rapid succession.

"What is your capacity?" was the next question asked by the interviewer. Again there was hesitancy and a request for more specific information as to the exact meaning of the question.

"Here was a man," said the business counsel speaking before an organization of executives, "who was engaged in selling his services and yet knew but very little about the article he was selling. He had evidently given no thought to himself as to what he had to sell but was very well informed as to his 'play' possibilities. He knew absolutely nothing about his value or possibilities as an earner. He was totally unfamiliar with his basic qualities—his most important assets."

After citing several instances of men wrongly placed, the speaker touched upon the qualities of a man for the position of treasurer. "Certainly," he said, "you would not put in a temperamental man as treasurer. A treasurer should be of a negative turn of mind, one who can look backward more rapidly than he can forward. The temperamental man would make an excellent sales manager."

Reverting again to the basic qualities of a person, this man enumerated 12 positive and negative qualities of mind which should be considered when selecting men for positions of an executive nature. He declared that he has successfully applied these 12 qualities in his work as special business counsel for many years, but was now willing to pass them on for assisting others.

Here are the 12 positive and negative qualities of mind as he gave them, the positive being given first:

1. A man is either mentally or manually inclined.
2. He is directive or dependent.
3. He has large scope or small scope.
4. He is deliberate or impulsive.
5. He is dynamic or static.
6. He has mental accuracy or mental inaccuracy.
7. He is either progressive or settled.
8. He is original or imitative.
9. He is adaptable or self-centered.
10. He has endurance or lacks endurance.
11. He has rapid mental co-ordination or slow mental co-ordination.
12. He has concentration or diffusion.

Take these 12 basic qualities and apply them to yourself, grading yourself either at the extremes or in between. They furnish an excellent start towards self-analysis.

Of course, comments can be made upon each one of these qualities.

Probably as good an illustration as any of the first, as to whether a person is mentally or manually inclined, would be the writing of a letter by a stenographer. A day after the letter is written, one stenographer could tell you the substance of the letter while the other stenographer would be unable to tell anything about it.

In other words, the first stenographer is mentally inclined for as she typed the letter she thought about it and its meaning, while the other simply typed and the thought of the letter just represented so many words to be ground out on a machine. The letter represented to her a manual operation, and the brain was not exerted in any way whatever.

The difference between the two is the difference between the girl who becomes a private secretary and the girl who becomes an excellent typist—one uses her head, the other her fingers.

A man is directive or dependent according to his ability to direct the work of others and the amount of supervision he, himself, requires. Some men are not good leaders themselves but require very little direction and can direct others if

they are once given direction themselves. Hence they would not be found at either extremes—they would be classed in between.

One man may be a poor captain but an excellent lieutenant, while another would never be more than a private in the ranks.

As to whether or not a man has a large scope or a small scope, consider two clerks in a store at $15 a week. Years ago Marshall Field was a clerk in a small country store. Between times he dreamed of a large business occupying a store with many floors, each devoted to a particular line, such as furniture, rugs, dress goods, etc.—and as he dreamed, he worked and his dreams came true. He had a large scope.

Another clerk also had his dreams, but what were they? His greatest dream was a country store with himself as the proprietor and his wife as a clerk. His is the mind of small scope.

Whether a man is deliberate or impulsive does not need any explanation. We are all familiar with the one who is entirely too deliberate and yet, on the other hand, the faults of the impulsive man are so apparent that comment is unnecessary.

The other morning coming into Chicago, an incident was witnessed which illustrated impulsiveness. As the train passed a crossing in a suburban village a man was observed walking on the sidewalk. He carried a small pail in either hand, probably paint pails, and a pipe was clutched between his teeth. It was windy and he stooped to set down the pails, evidently to readjust his hat.

Just then a gust of wind swept the hat from his head. Although the pails were resting on the sidewalk, he did not let them go but straightened up and started after the hat, pipe still in his mouth. The deliberate man would have released his hold on the pail handles—to say nothing of the pipe—and have been free to pursue the hat, neither physically fettered or vocally. But this man acted on impulse and was accordingly handicapped.

The dynamic energy of the late Theodore Roosevelt was a delight to his friends and a continual source of uneasiness to his opponents. The dynamic man is continually in motion accomplishing one project after another. Representative of the dynamic type in the telephone field are A. F. Adams, of Kansas City, Mo., member o the Operating board of the United States Telephone & Telegraph Administration and C. Y. McVey, of Columbus, Ohio, president of the Ohio State Telephone Co.

The static man has a tendency toward inertia and is brought to action only under stress and strain and then discharges most rapidly and without producing effective results. You are all acquainted with that type of man who will go along peacefully and then suddenly explode, creating "confusion worse confounded," and immediately afterward quiet down into an inactive individual.

Everyone has had experience with men of mental accuracy and mental inaccuracy. The statements of the man of mental accuracy are specific and reliable while those made by the inaccurate man must be taken with a grain of salt.

The progressive man is always a positive character for he looks to the future and plans his work accordingly. The man of a settled state of mind is content with "things as they are," and in the end loses out.

Imitation is not a great fault, for everyone should have a certain tendency to imitate but it should be combined with originality, for the best results. In some lines of endeavor originality is most essential.

The adaptable man has infinitely greater advantages than the self-centered man. The adaptable man is the one who "when in Rome does as the Romans do!" He is perfectly at home in any environment, in overalls or in a dress suit, while the self-centered person is like a fish out of water when he is out of his usual sphere.

Endurance is a great asset. There is a slight difference between endurance and health. A man may be in perfect health, be able to pass an examination for life insurance, and yet he may not have endurance. A man possessing endurance obtains it from repeatedly doing certain things or tasks. A man possessing physical or mental endurance has a great advantage over a man who lacks endurance. He can attain success where the more brilliant man fails, due entirely to capacity for putting in long hours without affecting his efficiency.

We have all had experience in explaining a proposition, going carefully into detail in regard to it, only to discover that the one talked to had not grasped the idea at all. He is slow of mental co-ordination. Again another person, after only a few words which present just the bare outline, comprehends the entire plan. He is of rapid mental co-ordination.

Concentration is a valuable asset to any person. The ability to shut from the mind everything except the matter under consideration and not allow one's "wits to go wool-gathering" is a marked characteristic of the positive man. It is that quality which enables him to think clear through a subject. It brings to bear upon a question under consideration, the full capacity of the mind and as a man can concentrate so his mental efficiency is determined.

The man who has diffusion of mind cannot keep his mind consecutively upon a matter, allowing other things to so interfere that there is just a jumble of thoughts and no definite results can be attained.

The study of the mind is a complex one and now greater attention than ever before is being given to it by business men. More and more it is apparent that the day of fitting a square peg into a round hole is passed. In other words, instead of "hiring and firing" until the right man is found to fill a certain position, efforts are being made to properly select a person for a position through the application of certain tests and principles.

The 12 positive and negative qualities of mind which have just been discussed indicate some of the points considered in obtaining "the right man for the right place." There are other methods and ideas used by vocational experts and these may be discussed at some other time.

A great deal has been published relative to the American telephone system in France. The illustration is a reproduction of a card which is attached to every signal corps telephone overseas.

In a letter to TELEPHONY from the office of the chief signal corps officer, Captain Edson I. Small states that the

U.S. ARMY SIGNAL CORPS TELEPHONE
CONNECTING WITH 396 SIGNAL CORPS EXCHANGES
IN FRANCE, ENGLAND & GERMANY
SIX EXCHANGES IN PARIS
THIS NUMBER IS ____
SEE DIRECTORY FOR ADDITIONAL INFORMATION

Card Attached to Every Signal Corp Telephone Overseas.

signal corps telephone system overseas has its exchanges in France, England and Germany, and connects with 396 different signal corps exchanges. In Paris alone there are six exchanges, a testimony to the telephone-using habit of the Americans.

The Dial Handles All Calls on The C. A. X.

(Community Automatic Exchange)

AUTOMATIC EL
CHI

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

SUBSCRIBERS served by the Community Automatic Exchange (C. A. X.) make all calls with the Automatic Dial.

For local connections, to other lines or to parties on their own line (number 45, for instance), they lift the receiver from the hook, turn the dial from "4" and then from "5" and the connection is made.

For calls to other towns, to toll points or for information, they call regular, assigned numbers, which connect them to the switchboard in the Company's main exchange.

Using the Dial insures quick, accurate service, 24 hours a day, every day in the year.

Using the Dial makes operators at the C. A. X. unnecessary. There are no salaries to pay for switchboard girls.

The C. A. X. telephones are of the common battery type. There are no dry cells to renew.

The C. A. X. equipment is simple and easy to maintain. An occasional visit by your present maintenance man is all that is needed to keep the apparatus operating properly.

The C. A. X. reduces operating costs to the minimum and gives your subscribers the best service skill can provide.

Let us tell you what the C. A. X. is doing for others and what it can do for you.

E TRIC COMPANY
AGO

Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies — Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Asks for Clarification of Nebraska Supreme Court Order.

The Nebraska State Railway Commission is preparing a request to the supreme court of that state which calls for a clarification of its recent decision in a rate case in which the Lincoln Street Railway Co. was involved. The decision affects profoundly the basis upon which all rate-making for public utilities rests.

The court decision cut straight across a number of theories that the commission has held to and which it has written into a number of telephone decisions. In other respects the court neglected to make clear matters that are of vital importance in rate-making. It did not discuss the ownership of the surplus earned over and above reasonable returns on the proper valuation and left only to be inferred that the stockholders own it.

This is exactly contrary to the commission's frequent decisions, all of its recent decisions granting increases in rates to telephone companies ordering them to hold in trust for the use of the rate-paying public whatever was earned above a reasonable return and all upkeep and other proper charges.

By adopting the present value of the property as the basis for rate-making the court, in the opinion of the commission, makes it possible for telephone companies to capitalize the large amount of enforced free labor that has been put into many of the rural lines. This refers to cases where farmers, in order to obtain service, have been compelled to pay for poles, haul them and also to pay for digging the holes or digging them themselves.

"The effort to clarify the decision," says Secretary Thorne A. Browne of the commission, "is not so much because of its effect upon the case before the courts as on the general work of the commission in the matter of rate-making. The commission has held for a number of years that where possible to ascertain, the basis for rate-making should be the sacrifice of the investors; that is, the amount of money put into the property by investors plus any proper dividends invested rather than paid out. It has held that the surplus earned over and above the expense of proper operation, proper maintenance of equipment, adequate depreciation, reserve and reasonable dividends, should not, even though put into additional property, be allowed to earn a return to owners of the plant because such property was paid for by the patrons of the company rather than by the company itself.

"The court held that for purposes of rate-making the present value of the property devoted to public use should be the basis and that investors' sacrifice was not the proper principle. It held also that reserve set aside to care for unrealized depreciation ought not to be a basis of earning. The commission has always allowed companies to earn on this depreciation fund, and is still of the opinion that unless this is allowed grave injustice is done the companies."

Seattle Wins Writ of Review of Increased Rates.

Through its corporation counsel the city of Seattle, Wash., on March 13, procured a writ of review of the recent public service commission finding sustaining the increase of telephone rates in the state. Postmaster General A. S. Burleson, as director general of telephone service, the Pacific Telephone & Telegraph Co., and the state commission are named as defendants. Seattle protests the increase as unreasonable and illegally allowed by the commission.

Judge John M. Wilson of the Thurston county superior court made the writ returnable April 10, at which time the company and commission are required to show cause why the whole telephone rate regulation proceeding should not be subjected to court review. The increased rates became effective in Washington on March 1, with the exception of Spokane rates, upon which additional testimony recently was taken.

To Show Cause Why Toll Rates Should Not Be Increased.

The Nebraska State Railway Commission has issued orders to a large number of Independent telephone companies in that state to show cause by April 1 why their toll rates should not be increased 25 per cent. These companies all connect with the Nebraska Telephone Co., and it has asked that they be made parties to its request for an increase of 25 per cent in toll rates which was granted some months ago.

Most of these connecting companies took it for granted, when the Nebraska's rates were raised, that they were entitled to increase their toll rates on messages originating on their lines and passing onto those of the Bell, because the rates the Nebraska company was permitted to charge quoted rates on their lines.

The commission holds that this is of questionable legality, and that it is a matter of vital consideration and determination. It has, therefore, issued the order to show cause why the connecting companies' rates should not be increased 25 per cent, such increase to be in force and effect until May 1, 1919, and subject to further extension.

Application for Rehearing in Denver Home Rule Case.

Interpretation of the intent of the people in 1912 in granting home rule cities, including Denver, the right to regulate "local and municipal" affairs, formed the basis of argument in the Mountain States Telephone & Telegraph Co.'s rate case with the city of Denver on March 10, before the Colorado Supreme Court. The court held recently that the rates which the Colorado Public Utilities Commission authorized were illegal, and the recent hearing was on the application for a rehearing in the matter.

The issue is whether the home rule amendment could confer all the powers upon a city for rate-making purposes which a legislature could grant. The company says it did not, and the city takes the position that it did.

James A. Marsh, city attorney, in resisting the application for a rehearing, pointed out that the charters then in effect were ratified by the people in adopting the home rule provision to the 20th amendment to the constitution, and that Denver at the time was exercising the power of regulating rates of local utilities.

He said the Colorado Supreme Court had heretofore held that the home rule provision was intended to confer all the power which the legislature could confer, and Norton Montgomery, assistant city attorney, said in this connection that the people exclusively have the right to grant franchises regulating the activities of utilities corporations in municipalities.

For the company Charles R. Brock said the matter of rates for Denver or any other city was not a matter of local concern when it came to telephone regulation, which was a state-wide enterprise and activity. He said the legislature had conferred the power of regulation of utilities exclusively on the utilities commission, and pointed out the fallacy of the argument of opposing counsel by asking how the settlement of rates between cities could be separated and distinct from the rates charged within the boundaries of a municipality.

The utilities commission was represented at the hearing, but took no part in

the argument, the commission's contention being that also of the company. The rates were announced last June and were put into effect with the understanding that the company would make good the excess charges in the event the court sustained the city's contention of self-regulatory power.

Rate Increase Granted to South Dakota Company.

The Moody County Telephone Co., which operates exchanges in the cities of Flandreau, Egan and Coleman and rural lines throughout Moody county, serving a total of 1,097 subscribers, has been authorized by the South Dakota Railroad Commission to establish the following increased rates:

	Per Mo.
Business telephone	$2.50
Residence telephones, main line	1.75
Residence telephones, party line	1.25
Rural party telephones	1.50

The exchange rates are subject to a discount of 25 cents per month for payment by the 15th of the current month and the rural rates are subject to a discount of 25 cents per month for payment quarterly in advance by the 15th of the first month of the quarter.

The present rates are $1.65 for business telephones; $1 for residence, and $1.25 for rural telephones.

According to the books of the company the cost of the plant and equipment amounts to $44,699.14 or an average value per subscriber's station of $39.70, which, the commission believes, is a very low valuation, and far below the average. On this basis the present rates will afford a rate of return, after allowing 6 per cent for depreciation reserve, equivalent to 1.36 per cent, whereas on the same basis the proposed rates will afford a rate of return of 5.32 per cent.

After a careful consideration of all the evidence the commission found that the books of the company do not represent the actual cost of construction of the plant and for the purpose of this case established a fair value of $56,000 upon the plant.

The proposed rates were found to be fair and reasonable and ordered placed into effect April 1.

At the hearing it was disclosed that the Miller Brothers were furnishing their private automobiles for the service of the company and making a charge only for the actual supplies or a rental charge. The plan usually adopted, and the one which the commission believes accords more nearly with proper practice, is to require the telephone company to furnish all of its equipment including such vehicles, automobiles or otherwise, as may be necessary for use in the maintenance of the plant. Under such a plan the telephone company stands the actual expense of ownership, operation, repairs and depreciation in the vehicle, and the commission recommends that plan to the careful consideration of the applicant in this case.

Rate Increases and Stock Readjustments Asked.

Hearing was held recently by the Nebraska State Railway Commission on the application of the Ord Telephone Co. for an increase in business rates of 50 cents a month and 15 cents on monthly switching charges. Ord is one of the few places in Nebraska where competitive exchanges are still maintained. Its rival there is the Farmers' Mutual, of Ord, a larger company but with fewer telephones in the city of Ord.

The company also desired a stock readjustment. It has been in operation for 15 years and no dividends have ever been declared upon the stock issued. The earnings have gone back into the plant, which has greatly increased in value. The stock is widely distributed, two men having 25 per cent of it and managing it. They now ask the company to permit the company to issue stock representing the dividends sacrificed in the past and to make such rates as will make a reasonable return upon the total amount of stock authorized.

H. H. Andrews, manager and chief owner of the Callaway Telephone Co. also submitted his application for increased rates and a stock adjustment. Much of the property of the company was built out of the rates except free services that were contributed by a retired farmer. The commission did not wish to pass upon this feature of the controversy until after the supreme court has clarified its recent decision relating to the basis upon which the value of property devoted to the public service shall be valued.

Standard Switching Charge Considered by Commission.

What's a proper standard charge for switching service? The Lincoln Telephone & Telegraph Co. has asked the Nebraska Railway Commission for a ruling on the matter. It suggests 50 cents a month itself. In a lengthy petition and showing made to the commission the company asks that it be permitted to standardize all switching charges at that rate.

The company switches at 31 of its exchanges. On 15 of these the 50-cent rate is on file and has been collected in the past; on 13 the company has been collecting 50 cents, but had no such rate on file with the commission, and on the remaining three it asks an increase to 50 cents.

The company has contended in the past that the amount of switching charges is not a rate for consideration and fixing by the commission, and that it is merely a private contract between two companies in which the public is not interested. The commission has declined to accept this view of it, and insists that rates cannot be fixed or collected unless due and proper application has been made to the commission.

It takes the view that the amount of the switching charge is important, because if the rate is to be made practically optional by a company it has the power to put the switched lines out of business and supplant it, whereas if they are made too low too great a burden is placed upon the company's own subscribers, who are called to respond in rates to make good the deficit from switching.

The commission has told companies that have complained because the Lincoln company had increased rates on its own motion that they need not pay and that they would be protected in such refusal, that the actual rate charge must be the one on file with the commission, and that to change this, application in due form must be made.

The company submitted a mass of data showing the costs of giving service and receipts at each of the exchanges involved.

Oklahoma Supreme Court on Physical Connection.

The right of one telephone company to connect its lines with that of another company, given under section 5, art. 9, of the constitution of Oklahoma, implies a mechanical union of the lines so as to admit of the convenient passage of messages from one to the other, but does not include the right to compel business intercourse between two competing companies to the detriment of either. The purpose is to establish and maintain means for a continuous transmission of messages, for the benefit and convenience of the public.

The court held that the corporation commission is without authority to arbitrarily require two competing telephone companies to establish a physical connection between their exchanges and toll lines, under rules and regulations which are unfair, and which work a discrimination against the subscribers of either company.—Pioneer Telephone & Telegraph Co. vs. State; Supreme Court of Oklahoma; 177 Pacific, 580.

Order Fixing Telephone Rates in Cleveland, Ohio.

An ordinance, fixing the rate that may be charged for telephone service by a telephone company within the limits of a municipality, is a local police regulation, within the meaning of that term as used in section 3 of article 18 of the constitution of Ohio.

The statutes of this state creating the Public Utilities Commission of Ohio (103 Ohio laws, p. 804), and conferring authority upon it to regulate public utilities and to fix the rate that such utilities may

charge for a commodity furnished or service rendered to municipalities and citizens of this state, are a valid and constitutional exercise of the police power by the General Assembly of Ohio.—Cleveland Telephone Co. vs. City of Cleveland; Supreme Court of Ohio; 121 Northeastern, 701.
701.

Commission's Jurisdiction Over Telephone Companies.

The Minnesota Railroad & Warehouse Commission, under the laws of 1915, c. 152, §§ 1, 2 (Gen. St. Supp. 1917, §§ 4623—1, 4623—2), is given jurisdiction and supervisory powers over telephone companies the same as it has over railroad and express companies; and such jurisdiction extends to all companies which are engaged in furnishing telephone service, regardless of the character of their organization.

The statute is not unconstitutional as conferring judicial powers upon the railroad and warehouse commission. The powers conferred are administrative and legislative in character. The reasonableness of its orders is a judicial question reviewable on an appeal to the district court for which the statute provides.—Hilton, Attorney General, vs. Four Lakes Telephone Co.; Supreme Court of Minnesota; 169 Northwestern, 480.

Injury to Person While Using Neighbor's Telephone.

Where a neighbor of one with telephone service secured permission to use the telephone, and was injured by an electric shock or otherwise, at best she was a mere licensee, and could recover from telephone company only if injuries were willful, wanton, or malicious. The court held that proof of accident did not suffice to make prima facie case under doctrine of res ipsa loquitur.—Inman vs. Home Telephone & Telegraph Co.; Supreme Court of Washington; 177 Pacific, 670.

Summary of Commission Rulings and Schedule of Hearings.

ILLINOIS.

March 25: Hearing at Chicago in the matter of the proposed advance in rates for telephone service in Cornell and vicinity by the Cornell Telephone Co.; supplemental application filed for further increase of 25 cents per month providing that a discount of that amount be allowed for payment by the 15th of the current month. No. 6851.

March 25: Hearing at Chicago in the matter of the application of the Morrison Telephone Co. for authority to charge a toll rate of 10 cents between Morrison and Erie, in connection with the Crescent Telephone Co.; protest filed by the Crescent Telephone Co. No. 8932.

MINNESOTA.

April 2: Hearing at Hewitt on the application of the Hewitt Telephone Exchange Co. for authority to increase its local and rural telephone rates.

April 8: Hearing at Redwood Falls on the application of the Redwood County Rural Telephone Co. for an indeterminate permit to operate a local telephone exchange at Redwood Falls, Minn.

April 11: Hearing at Harmony on the application of the Harmony Telephone Exchange Co. for authority to increase its local and rural telephone rates.

NEBRASKA.

March 17: Application of the Farmers' Telephone Co., of Alexandria, for permission to sell additional stock; filed.

March 17: Application of Lincoln Telephone & Telegraph Co. for permission to cancel switching rate at Belvidere, filed.

March 17: Application of Palisade Telephone Co. for permission to eliminate free service to Hayes Center, filed.

March 17: Application of Banner City Telephone Co. for permission to increase toll rate to Hendley, filed.

March 17: Complaint of A. T. Ready against the Riverton Telephone Co. alleging that the hours of service are too brief, filed.

March 17: In the matter of the application of the Nebraska Telephone Co. to make certain named connecting telephone companies parties to date application; order issued that each of these companies be served with order to show cause on April 1 why toll rates charged by them as per schedule on file with the commission shall not be increased 25 per cent, the rates to be in force and effect until May 1, 1919, or until such further date as they may be extended.

March 18: Complaint filed by Bartek Bros. against Lincoln Telephone & Telegraph Co. alleging poor service on Loma exchange.

March 18: Complaint of Rock Island Railroad against Jansen Telephone Co. alleging that company has erected telephone poles on railroad right of way, filed.

March 19: Complaint of L. J. Vanantwerp against Callaway Telephone Co. alleging poor service, filed.

March 19: Complaint of Albert Thornton against Lincoln Telephone & Telegraph Co. alleging poor service and higher charges than schedule permits, filed.

March 20: Application of Carroll Telephone Co. for permission to publish schedule of gross and net rates, filed.

March 20: Application filed by Lincoln Telephone & Telegraph Co. for standardization of switching charges at 50 cents a month and for leave to publish schedule of charges therefor at various exchanges where such service is rendered, filed.

March 21: Application of Ord Telephone Co. for permission to increase business rate 50 cents per month and switching charges 15 cents, together with request for permission to issue stock in lieu of dividends undeclared in past year and for sacrifices of officers; heard and submitted.

March 21: Application of Callaway Telephone Co. for permission to increase rates and for stock adjustment; testimony heard in part and case continued until the company can make an inventory and physical valuation of the property.

March 21: Application of the Farmers' Telephone Co. for permission to issue additional stock; permission given, order setting up that all sales shall be made for cash at par, that the proceeds shall be applied entirely for extension of existing lines, with the requirement that the company make full report of sales and disposition of the proceeds thereof.

March 21: Complaint of John McIntyre of Wayne, asking that the Usher Telephone Co. be required to interchange service, filed.

March 21: Complaint of C. C. Wilson, of Dawson, against Nemaha Telephone Co. alleging refusal to repair telephone and put in proper condition; also for disconnection because of refusal to pay rental; dismissed as satisfied.

March 21: Application of the Nebraska Telephone Co. for permission to destroy certain accounts, records and memoranda; the commission being satisfied that no further usefulness remains for them, the request is granted.

NEW YORK.

March 11: The New York Telephone Co. notified the commission that it had modified its practice regarding the charge for installation of telephone service so that customers who made contracts or verbal arrangements for telephone changes would be entitled to refunds, the difference between the amount agreed upon and the amount actually charged.

The commission recently ordered refunds to be made following complaints from various parts of the state. It was said that telephone representatives made contracts and arrangements for service under the old schedule after the telephone service of the country had been taken over by the government.

SOUTH DAKOTA.

March 14: Increase in rates granted to the Moody County Telephone Co., which operates in Flandreau, Egan and Coleman. No. 3479.

March 17: The commission ordered that the connection as now established should be maintained between the rural line of the W. G. Flat Telephone Co. and the exchange in Hot Springs of the Peoples Telephone & Telegraph Co;

That a contract be entered into providing that the rural party line subscribers on the line having direct connection with both exchanges shall be entitled to interchange of service with Hot Springs upon the payment by the W. G. Flat Telephone Co. of a switching rate of not to exceed $2.25 per telephone per year;

That if a majority of the subscribers receiving service on the line running south and west of Buffalo Gap desire service at Hot Springs on the flat rate basis, the contract shall contain a provision that such service will be furnished upon the payment by the Flat company of a rate of $1.50 per year for each and every telephone receiving service on the line;

That the Flat company be required to establish and put into effect a rental rate to be paid by those subscribers on lines having exchange service with Hot Springs upon the flat rate switching basis of $1.50 per year higher than the rate charged to and collected from those subscribers receiving service on lines not entitled to flat rate switching service with Hot Springs;

That the telephone stations of its town subscribers in Buffalo Gap be detached from those rural party lines receiving switching service at Hot Springs and be attached to the line or lines installed for the furnishing of town or exchange service in Buffalo Gap;

That all messages to Hot Springs originating at stations other than those connected with the switched lines be routed over toll equipment. No. 3178.

Practical Subjects—Discussions

The Inspection of Telephone Poles in Connecticut.

The pole inspection method used by the Southern New England Telephone Co., as described in The Telephone Bulletin by John Putnam, requires the services of a foreman and two helpers, one of whom must be able to climb. The pole inspection is made as follows:

One man clears away the turf and soil from the base of the pole; a second man follows and trims away the dead wood, measures the circumference above the ground and the least circumference of the trimmed portion; the foreman makes the proper records of the inspection on the form provided for the purpose. The pole is finally sounded for "hollow heart" and the climber examines it for defects above ground, previously noted.

A mattock is used to clear away the turf and stones from the base of the pole. This tool is believed to be better than a shovel because of the difficulty experienced with the shovel in clearing away obstructions, such as roots, heavy turf and small boulders used for bracing the pole. The mattock eliminates this difficulty to a large extent, as the sharp edge cuts the turf and roots and the increased leverage obtained by its shape quickly and easily permits the removal of boulders of considerable size.

The use of large stones near the top of the ground in place of proper tamping, is very inadvisable, in Mr. Putnam's opinion. The stones are apt to leave holes beneath them which fill with water and allow the air to circulate, all of which results in a rapid rotting of the pole butt. He suggests that no stones be placed about the poles above a point 18 inches below ground.

To trim away dead wood at the butt of the pole, a chisel with a face three inches wide and handle two and a half feet long is used. A hatchet was formerly employed but the chisel was found to be more satisfactory. It removes the dead wood quickly and easily, leaving a smooth, hard surface with a minimum cutting away of the sound portion of the pole. Such a result cannot be obtained by the use of a hatchet, as the conditions present an extremely awkward position in which to swing it and few men have the necessary skill for this sort of a job. The hatchet leaves cuts and splits on the surface of the sound wood which afford an ideal chance for rotting to start anew. The chisel is also useful for digging out pockets formed by rot.

With the mattock and chisel 100 poles a day can be inspected whereas with shovel and hatchet inspecting 75 poles a day was considered a good day's work.

Experience Is a Sure Though Oftentimes Costly Teacher.

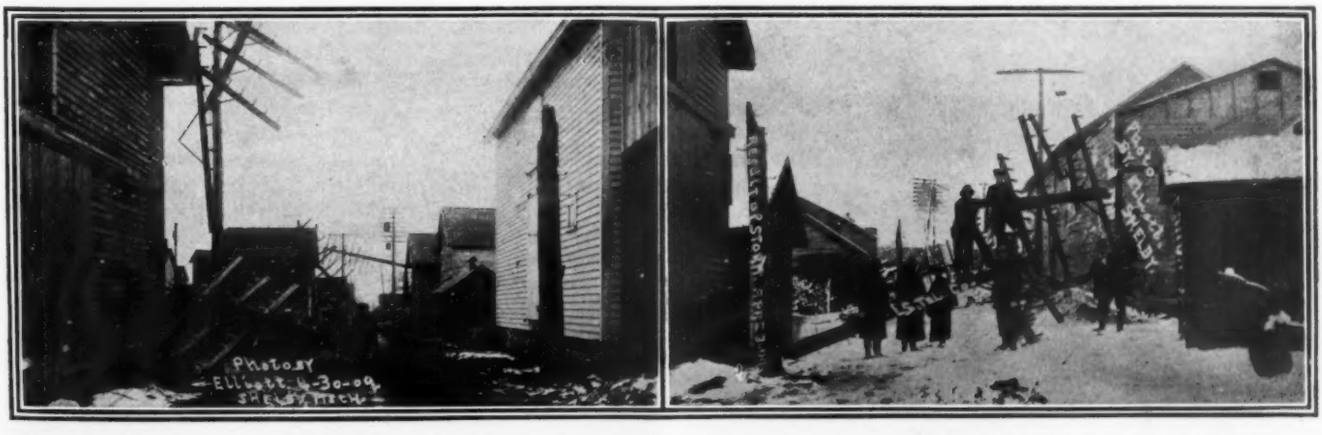
The accompanying views of the pole lines of the United Home Telephone Co., of Muskegon, Mich., of which Thos. Bromley, Jr., is general manager, were taken after a sleet storm in 1909. They show what was left of the company's plant in Shelby, Mich. The city was out of service for nearly 60 days, in which time the company built a new plant from the ground up, using all cable instead of open wire construction.

Havoc Wrought to Telephone Lines in Shelby, Mich., by Sleet Storm.

The wise telephone manager who still has open wire construction will profit by another's experience and replace it with cable construction before a similar disaster occurs and deprives his subscribers of telephone service for weeks or perhaps several months.

Repairing Telephone Switchboard Cords and Plugs.

A method of repairing switchboard cords and plugs which has been found to be very satisfactory in one of the exchanges of the British Columbia Telephone Co. is described in a recent issue of Telephone Talk. Formerly in han-



A Convincing Argument for the Elimination of Open Wire Construction—Scenes in Shelby, Mich., After a Sleet Storm.

dling the repairs of defective cords—that is, cords that are frayed, open, or in trouble for any other reason—the switchboard men would remove them from the board, count, list on repair sheets, tie in bundles, and send them by truck to the repair shop through the stores department. After repairs and tests there, they would be returned in the same manner to the originating office.

It was felt that much of this labor could be eliminated if the cords were repaired without removing from the switchboard, and with this view in mind, portable cord repair benches were designed and manufactured in the company's repair shop.

These were made of oak, one end forming a seat and the other carrying a turret in which are drawers and pigeonholes for the small piece parts used in repairs. Below the pigeon-holes is an opening into a compartment for collecting the ends cut from cords and other waste. The top is level with the key shelf and carries a plugging tool for removing and replacing the plugs, a cutting block and a shellac bottle. The arrangement is neat and the construction compact, the result being a bench that greatly facilitates the work.

Before a plug is replaced it is given a "breakdown" test, to see that the insulation between the tip, dead collar, ring and sleeve is not defective, thus preventing ringing and other troubles. The jacks for this test are mounted in the face of the turret and will take the No. 109 and No. 110 plugs. They are connected to the 110-volt lighting circuits by the extension cords that supply light for the benches. After assembly, the cords are given standard tests for operation and are then ready for use once more.

Some interesting figures have been compiled by the company, from tests made, of the life history of different types of cords installed on adjacent positions, and covering a period of 17 months. The average number of operations per cord before any repairs were necessary was 18,566, and the average total number of operations or connections made to the end of the life of the cords was 72,100 per cord. The number of troubles was divided, 72.3 per cent being due to frayed braid and 27.7 per cent to conductor trouble.

Purpose of Flux in Soldering—How to Use the Flux.

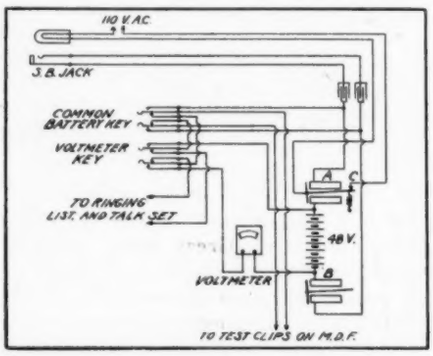
The purpose of a flux in soldering is to clean the surfaces which are to be soldered and to put them in a condition to form a good connection by preventing oxidation. It also causes the solder to flow smoother and makes a neater looking piece of work.

It has been found by experience that rosin is one of the best fluxes. In addition to the self-fluxing solders, there is the ordinary solder which contains no flux and is on the market in pigs, bars, triangular strips and wire of various sizes. In using this solder, flux of some kind must be applied to the object to be soldered.

It may be well to add that when using rosin-core solder unless the flux rests against the joint when the solder is being melted, the flux has no effect. The rosin-core solder should not, therefore, be first applied to the hot tool with the idea of soldering the joint by then applying the tool to the joint.

A Common Battery Telephone Set for Everybody.

In many of our smaller exchanges, one man has to be wire chief and troubleman at the same time, and quite often it is necessary to pick up poor line connections and short circuits where a magneto test set is unhandy to use and unsatisfactory in results. Common battery, fed out to a metallic line over one side and ground, will supply everything that the wire chief could want in testing poor connections in rusty wire. At the same time it can be used for a talking circuit with the ordinary common battery test set.



Common Battery Signalling Arrangement.

A voltmeter is quite satisfactory if somebody is kept at the office to take readings, but on long iron wire circuits it often takes a long time to find a poor connection. With this equipment the operator can be flashed at any time and talked to or a voltmeter reading made.

The accompanying sketch shows an arrangement for use with a Weston alternating current voltmeter to be used by the operators after they are signaled. The common battery signaling apparatus is the feature of this outfit and can be built by anybody out of a few pieces of old equipment found in anybody's junk pile.

On the voltmeter, we use a 45-volt dry battery, which is about right for use with the coils used as relays, marked *A* and *B* in the sketch. These are old 2,500-ohm ringer coils and one is mounted so that a coiled spring holds the armature in one position. The clapper is cut off and a platinum contact is put in its place so that when battery is fed through the coils contact is made at *C*. This completes a circuit through a 110-volt signal lamp with a miniature base mounted on back of a filler strip with an opening directly over the jack on the switchboard.

To use this equipment for testing on a metallic line, if there are grounded lines in the exchange, one test clip is grounded and if the sleeve is the common ground on the grounded lines, the other test clip is connected to tip of line under test. A man can then proceed anywhere on the line and signal and talk to the operator with the common battery test set.

For testing opens and cable pairs, the operator is flashed when the pair is found O. K. In addition, the wire chief's desk is equipped with keys for testing for grounds, foreign alternating currents where parallel to high tension lines and voltage of ringing equipment.

L. H. SATTERLEE,
Blue Earth Valley Telephone Co.
Winnebago, Minn.

Condemns Practice of Visiting in Operating Room.

At a hearing before the South Dakota Railroad Commission, on the application of the Moody County Telephone Co., of Flandreau, S. D., for an increase in rates, it developed from the testimony that the switchboard is in a general office where the operators are accessible to the public and more or less visiting takes place.

"This," the commission stated, in its opinion, "is bound to interfere with good service. A telephone operator may not successfully visit and attend to the wants of the subscribers at the same time. The telephone company will be required to so rearrange its office as to eliminate this practice of visiting and the carrying on of any other occupation by the operators while at the switchboard.

"Side conversation and reading of books and papers should be entirely eliminated during working hours. The switchboard should be so arranged in the office as to afford plenty of light and good comfortable quarters for the operators but the public should be excluded from the privilege of visiting."

Meeting of Western Pennsylvania Association in April.

The regular quarterly meeting of the Western Pennsylvania Independent Telephone Association will be held at the Fort Pitt Hotel, Pittsburgh, Pa., April 11 and 12. Manufacturers and jobbers have been notified to exhibit their wares at this meeting, and it is the intention of the officers to turn a great deal of the time at this meeting over to the manufacturers, and to make this more or less a manufacturers' and jobbers' meeting.

Sundry Snapshots Along the Trail

Observations and Comments, Pertinent and Otherwise,
On the Sunshine and Shadows of Telephone Work

By Well Clay

If you watch the pace as they start the race,
In Life's grand free-for-all,
Don't place your bet 'till the odds are set
And they wait the starter's call.

When they begin, you may pick to win,
Some one that heads the string;
Who is clean and straight and packs no weight
But looks like a dead-sure thing.

But I'll give you a tip: There's many a slip
And many queer things transpire;
Some runner you've missed may come first on the list
And beat them all under the wire.

'Tis no cinch it will be the untrammeled and free
That steps out ahead the first lap;
Who keeps up the pace and wins in the race—
It may be one with a handicap.

It has been said that a handicap is a good thing in the race for success, because the consciousness of the fact stimulates the afflicted one to greater efforts if he desires to win. As a general thing, most people desire to win and more especially do they feel the awakening of desire if, as ofttimes happens, they are not fully endowed with all the qualities of the normal.

To the boy who is born without the handicaps of poverty, there seldom comes that awakened desire to achieve for himself the things with which he is already surrounded as it does to that youth who is obliged to make his advent into the world with nothing in the line of the world's wealth awaiting him. The one who may be suffering most from a lack of funds may be the party who could give you a definition of the desirability of having them better than the man who had an over supply.

If a handicap is a good thing in one race, it may help some in others. The telephone men in Minnesota certainly hope so, as we are at present handicapped with one very strict labor law relating to the employment of female labor, and are threatened with a much more stringent one.

While most states would feel that a 54-hour-a-week law for the employment of operators would be quite a drawback, I wonder what they would think of a proposal to limit females to 48 hours a week without the privilege of putting in overtime, even in case an emergency should exist? These hours also are to include lunch and rest periods; rest periods occurring every two hours, which must not be spent in the operating or usual rest rooms.

On top of this new aid to successful operating of an exchange, another proposed law expects to add to our difficulty in getting rid of surplus funds by imposing a raise of 25 per cent in our taxes. As we are scarcely taxed at all now, outside of some half a dozen different ways, this will be a grand boon to the average manager and assist him from accumulating a surplus which will be burdensome.

The question of whether the state can levy and collect additional taxes from a government-operated utility apparently does not enter into the minds of the lawmakers. Could the state levy and collect a tax on mail matter passing through the post office? It seems to me to be much the same thing. Perhaps the handicap will force a still greater number of telephone managers to apply for rate increases and in that manner assist us in winning the race.

This same tax bill is to levy a graduated tax depending on the amount of the gross earnings, probably on the theory that if a little orange is sweet, a big one will be sweeter. Great minds some of these legislators must have? The telephone business must seem to them to be a thing apart from other business, so far as its being able to withstand any kind of misuse and still come up smiling with the usual dividends along about the first of January. Like the hat of the parlor magic man, it never gets empty, though many things are taken from it larger than the hat itself.

It has been argued by legislators and members of the tax commission that telephone property does not pay as heavy taxes in proportion as the general run of other lines of business, which is probably not correct, but even if it were, they fail to take into consideration the very heavy tax we all pay which is not imposed on the majority of other business ventures. I refer to the tax imposed on us when we are obliged from force of circumstances to give away to the public, year in and out, at least 25 per cent of what we have for sale.

In furnishing free service to our communities for all those people who continually use the telephone without paying therefor, we are being taxed just as clearly as if we were called upon to pay the cost of that extra service to the state in the form of taxes. Add this cost of free service to your regular taxes and then compare with the grocer and the butcher and baker who do not give away any large percentage of their stock in trade. How does the comparison appear?

This same legislature that taxes the telephone more, would take it as a joke if you were to ask it to pass a law making it a misdemeanor for anyone to use a telephone, unless he paid for the service either in the form of monthly rental or on a message basis. They make it a crime to steal meat and bread and clothing. Why not apply some of the same medicine to telephone service before trying to collect a larger tax.

We might argue justly that if we are not paying as large a direct rate of taxation as some more fortunate lines of endeavor, we are also running our business nearer to modern requirements on a pre-war rate than any others. The man who can grapple with and settle successfully the average run of telephone problems to be met with today, would do well on the commission which is to settle the League of Nations idea.

We are all well aware that every line of endeavor will have to shoulder additional tax burdens, and we are willing to share with the others, but we want to be put on an equal basis to start with, that is all.

Another thing which is puzzling at this stage of the game is the fact that labor uplifters should take this opportunity to rock the boat, so to speak. That is what they seem to be doing when they seize on a time like this to stir up female labor to ask for things which are not what that class of labor wants, on mature thought.

The girls are not out for shorter hours, adjustable foot rests, or ten-minute recesses. What they really want, and should have, is more money per hour, and a chance to work a reasonable number of hours a week at that price. She is willing to help out after hours on reports or other work and is willing to take the extra pay which she earns. Above all, she wants a job, not legislation which will have a tendency to put her out of one.

APHORISM: There are many ways to skin a cat—but the cat hates them all.

Meeting of Sixth District of Missouri Association.

The Sixth District Missouri Telephone Association held a convention and operators' school at Hotel Terry, Sedalia, Mo., on Wednesday and Thursday of this week, March 26 and 27.

J. G. Crane, supervisor of the Missouri district of Independent Telephone lines, was present and discussed the orders,

rules and regulations issued by the United States Telegraph & Telephone Administration. The operators' school was in charge of A. J. Shands, traffic manager of the Kinloch Long Distance Telephone Co. and H. E. Gwillim, traffic superintendent of the Kansas City Long Distance Telephone Co.

CIRCUITS WITH ZERO MUTUAL INDUCTION.

(*Continued from page* 18.)

circuits, the loss of space will be small, for a larger number, one or more crossarms of standard construction may be incorporated in the lead.

Effects of the Constants of the Circuits.—The capacitance of the phantoms is about 30 per cent greater in the proposed forms than in present practice, and the inductance correspondingly less. The change in the constants of the side circuits is very slight.

Cost.—On account of the necessity of re-spacing the cross arms, or of providing special insular supports, the cost of converting from the standard form to one of the proposed forms is evidently in general considerably greater than that of re-transposing a standard form lead. The cost of converting to form *E* with an increased number of circuits may in some cases be less than that of providing the additional circuits by the standard method.

For initial construction of forms *A* or *C* there would apparently be no increased cost of materials, and a saving in the cost of transposing. Form *D* presents a slight increased cost of materials, due to the increased number of crossarms per circuit-mile.

IV. Conclusions.

The anticipation that the use of the proposed forms of telephone line construction and transposition under exposed-line conditions will give greater refinement of balance and increase the flexibility in co-ordinating with transpositions and discontinuities of the disturbing circuits, particularly, when the telephone circuits are phantomed, appears to be justified.

The proposed forms appear to be especially well adapted for use on joint pole lines and in other cases of severe or irregular exposure. Obviously, they affect only the particular phases of inductive interference for which transposition is a remedy. The worst effect of severe exposure to power circuits is that of the high longitudinal electromotive forces and currents induced in the telephone circuits when an adjacent power circuit operates normally with a ground return, or is accidentally grounded.[3]

The increased balance of the open-wire circuits afforded by the proposed forms should permit operating with larger values of longitudinal currents than in the standard form, except where the limiting value of the current or e. m. f. is determined by conditions of safety, or by the balance of the terminal apparatus.

Present-type phantoms are often used as parts of longer lines, despite the fact that they are considerably more susceptible to noise and crosstalk than are the physical circuits, and that a given amount of noise is of greater importance in the longer circuit. The proposed forms in which the phantoms are relatively immune from disturbances, bring the desirable qualities of noiselessness and good transmission together in the circuits where they are most needed.

Form *A* is for use in new construction where space limitations are extreme.

Form *C* permits an appreciable saving of space, with a good degree of balance, a saving in the number of transpositions and transposition poles, and increased flexibility in the location of discontinuities in power circuits, as compared to the standard *E*-section.

Form *D* gives a considerable reduction of type unbalance and unbalance due to unequal transposed lengths, with a slight increase of cost, as compared to form *C*.

Partial or complete conversion to form *E* recommends itself when it is desired to route one or more high-grade phantom circuits through locally adverse conditions, or where it is desired to add a few circuits to the lead under conditions of limited space. Partial conversion to form *A*, *C*, or *D*, may also be effected; in these forms, the phantoms have better balance than in form *E*. Such conversion is, of course, conditional on the ability of the cross arms to support the additional weight.

Forms *F* and *G* promise the highest degree of balance of all the forms shown but would probably not be considered in the present state of the art on account of the special construction required.

(*To be continued.*)

[3] "Transposition and Relative Location of Power and Telephone Wires," P. M. Lincoln, Trans. A. I. E. E., 1903.
"Inductive Effects, Etc.," H. S. Warren, Trans. A. I. E. E., August, 1918.

	Standard E-section	Proposed Fig. 10	Proposed Fig. 11
No. of transposition poles per section			
First 40 wires	32	16	32
Additional wires	64	16	32
No. of transpositions per section, 40 wires	288	141	179
Wires cut	876	564	716
Balance to distant non-transposed circuits, every	Eighth-section.	Eighth-section.	Eighth-section.
Balance to near non-transposed circuits, every	Eighth-section.	Eighth-section.	Eighth-section.
Balance to distant 3-phase power circuits for	Half-section.	Quarter-section.	Quarter-section.
Balance to near 3-phase power circuits for	Two successive half-mile barrels. 3, 6, or 12-mile barrels.	Single half-mile barrels. 3, 6, or 12-mile barrels.	Two successive half-mile barrels. 3, 6, or 12-mile barrels.
Neutral points for discontinuities of telephone lead.	Quarter-mile barrels, 12-mile barrels. S-poles	Quarter or half-mile barrels, 6 or 12-mile barrels. S-poles	Quarter-mile barrels, 6 or 12-mile barrels. S-poles, half-section points.

Balance for a half-section, equal to Fig. 10 for a whole section.

Comparisons of Designs for Transposition Sections.

Telephone Used in Fog Signal System at San Francisco.

A distinct innovation in water-front electrical application is the installation of a telephone transmitter at each of the bells and horns making up the fog signal system which protects the shipping on the San Francisco water front, says C. B. Merrick in The Journal of Electricity.

The circuits from the transmitters are run to a central switchboard located in the main office at the Ferry Building, where a receiver can be plugged in so that the operator can "listen in" on any one of the signals. In this way, a constant check can be made to be sure that each is operating properly without the necessity of covering the miles between them.

A plug connection is also located at each transmitter which may be used by any operator or repairman who desires to call the headquarters. For this purpose, a portable telephone set is included as a part of his kit. With this set, he can keep the office continuously informed of his location, and in this way save much valuable time.

Tools Which a Telephone Switchboard Man Needs.

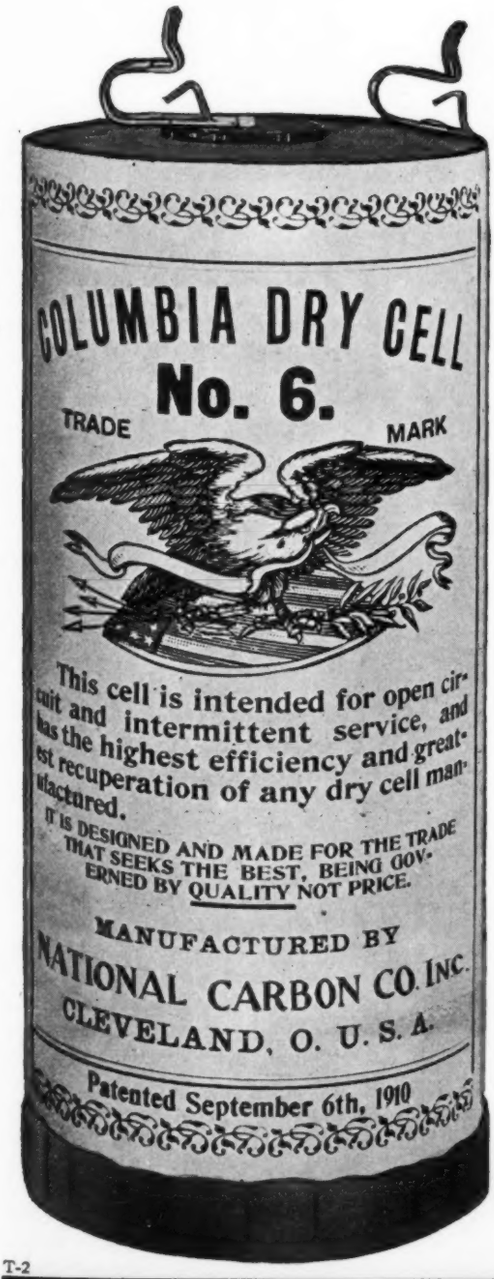
The tools a switchboard man requires are very few for the ordinary repair work. These tools should be selected with care and kept in good condition. The small tools should be carried in the pocket so as to be available at all times. These can often be obtained in a leather containing case so as to fit the pocket. The necessary pocket tools are:

One pair 5-inch long nose pliers.
One pair 4 or 5-inch side-cutting pliers.
One good pocket knife.
One small short-blade screw driver.

Other tools are very essential at times, but the above are used much more and form the most useful part of the good mechanic's equipment.

Columbia Telephone Cell

less cost per day of service


COLUMBIA DRY CELL
No. 6.
TRADE MARK
This cell is intended for open circuit and intermittent service, and has the highest efficiency and greatest recuperation of any dry cell manufactured.
IT IS DESIGNED AND MADE FOR THE TRADE THAT SEEKS THE BEST, BEING GOVERNED BY QUALITY NOT PRICE.
MANUFACTURED BY
NATIONAL CARBON CO. INC.
CLEVELAND, O. U. S. A.
Patented September 6th, 1910

TELEPHONE MEN the world over know how the Columbia Gray Label proves the old adage that "talk is cheap." Columbias are built to make the line talk up with a snap; by reason of their long life they do it at less cost per talk—which means *less cost per day of service.* Fahnestock Spring Clip Binding Posts at no extra charge.

National Carbon Company, Inc.
Cleveland, Ohio

Columbia Gray Label Cells take the "What's that?" out of the talk—subscribers appreciate being heard the first time

T-2

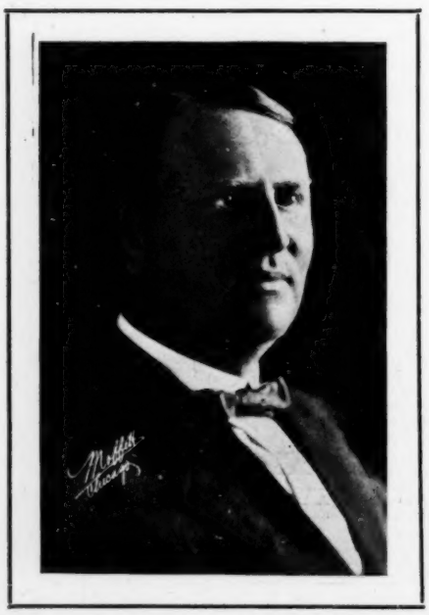
Biographical and Personal Notes

Lewis Corrington, manager of the Tecumseh (Neb.) exchange of the Lincoln Telephone & Telegraph Co. for some time, who recently resigned that he might get outside employment, in the interests of his health, has been given work at Auburn by the Lincoln company.

The Lincoln company recently bought the holdings of the Auburn Telephone Co. and Mr. Corrigan will take charge of the wire work for the Auburn exchange, and three or four exchanges connected therewith and a part of the system of the former company. He is of the opinion that the out-of-door work will be of benefit to him.

J. D. Bonnar, for the past four years wire chief of the Ashtabula Telephone Service Co., Ashtabula, Ohio, has been made manager, succeeding S. R. Newberry, deceased. During the illness and following the death of Mr. Newberry, Mr. Bonnar has been acting as manager of the company. A total of 4,040 telephone patrons, using 4,353 telephones, are now served by the Ashtabula company, an increase of 184 over the preceding year.

J. T. Thomasson, president and manager of the Lancaster Telephone Co., of Lancaster, S. C., entered the telephone business about 25 years ago when he organized a small company in York, S. C., known as the Bedford Telephone Co. Later on he organized and built the telephone system at Lancaster, which at that



J. T. Thomasson, President and Manager of the Lancaster (S. C.) Telephone Co.

time was a part of the Bedford system. The name was later changed to the Lancaster Telephone Co.

The Lancaster exchange served some 35 subscribers when it first began operations in 1898. It now furnishes common battery service to 320 subscribers in Lancaster, or a total of 500, including rural stations.

"J. T." is an excellent observer and has a great capacity for facts, especially those relating to financial, commercial and social matters. He has a good memory and is an interesting talker. A man of good, all-around ability, he is a good mixer and sympathetic in his manner. Of an even temper, he has the ability to put things over without arousing disputes or hard feelings He is the well-rounded, adaptive man who can handle people without friction.

Mr. Thomasson was born in Gaston county, N. C., on October 8, 1867. He attended the public schools of North Carolina and graduated from the Wake Forest College in North Carolina.

He was engaged in the mercantile business prior to entering the telephone field. He is a member of the United States Independent Telephone Association.

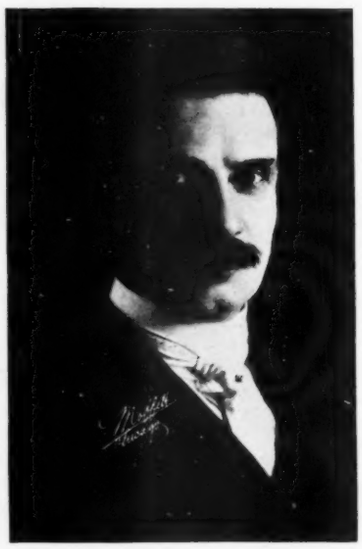
Harold Edward Brockwell, chief engineer of the Manitoba Government Telephones, Winnipeg, Manitoba, has been engaged in the telephone business for 34 years. He was born in Bridlington, England, September 26, 1870. He received his education at Arnold College, London, and the Finsbury Institute of Technology.

"Brock" is the very active, hard-working type of man, with a great deal of endurance, one who can work 18 hours out of 24 for a long period, and even put in a full 24 if it is at all necessary. There are very few things that escape his notice, for he is on the alert and observing things all the time. Just chuck full of force and ability to put things over, Brock is a doer rather than a talker, for he can move and act a great dea' quicker than he can speak.

Rather cautious, he makes certain that his proposed line of action is advisable and then he puts forth every effort to make it an accomplished fact. As he is of an ambitious nature, whenever he undertakes a thing it is pretty certain to succeed, for he does not like to "fluke" on anything. Quiet, but affectionate in his nature, "Brock" is artistically inclined and a lover of music. He didn't tell us that, however, for he has a habit of keeping a great many things to himself.

Mr. Brockwell's first experience in the telephone business was in June, 1885, as assistant electrician for the United Telephone Co., of London. He migrated to Canada in 1890 and for five years was employed by the Bell Telephone Co. of Canada as local manager.

From 1906 to 1910 he was local manager and superintendent of plant for the British Columbia Telephone Co. He was then special engineer of traffic for the Tri-State Telephone & Telegraph Co. of St. Paul, Minn., for a brief period, and in 1911 he was appointed assistant engi-



H. E. Brockwell, Chief Engineer of the Manitoba Government Telephones.

neer of the Saskatchewan government. The following year he was appointed to his present position as assistant telephone commissioner and chief engineer of the Manitoba Government Telephones.

The Manitoba government telephone system serves some 50,000 subscribers and has an investment of $12,000,000. It commenced operations 27 years ago with 700 subscribers.

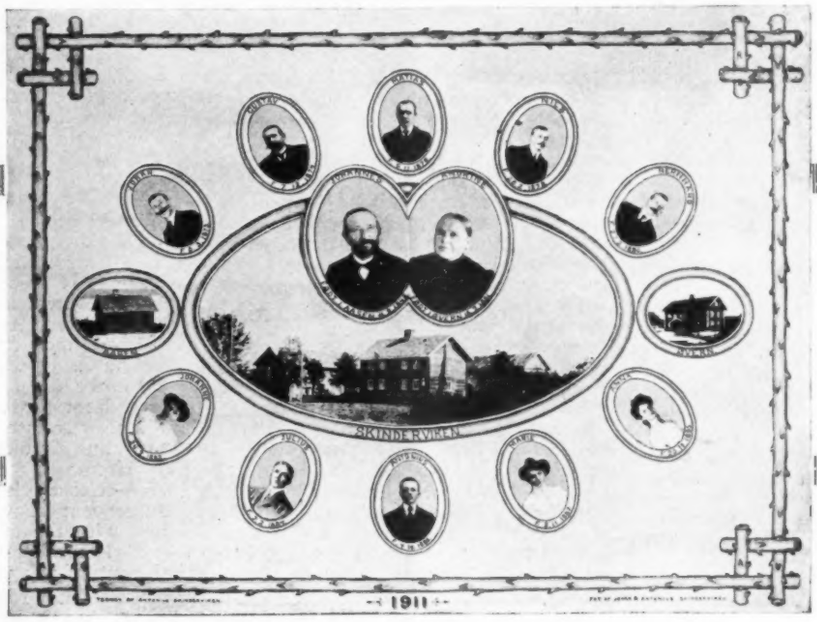
Mr. Brockwell designed the recall common battery switchboard which is now the standard of the Manitoba system, and a toll order table (automatic toll) also the Manitoba Government Telephones standard.

He is a member of the Institute of Electrical Engineers, of London, and an associate member of the Canadian Society of Civil Engineers.

R. C. Hall, assistant secretary and assistant treasurer of the Cincinnati & Suburban Bell Telephone Co., of Cincinnati, Ohio, has been promoted to secretary and treasurer, succeeding Volney Elstun. He has also been elected to the directorate.

E. N. Squier, who was formerly with the Villisca Farmers Mutual Telephone Co., of Villisca, Iowa, is now manager of the Afton Mutual Telephone Co., of Afton, Iowa.

Charles Dickenman, is the new manager of the Lincoln Telephone & Telegraph Co. at Tecumseh, Neb.



SKINDERVIKEN—

is the name of a man — you may have thought it the name of a telephone specialty.

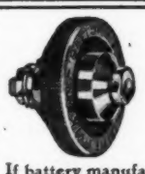
The singularity of the name has brought considerable comment and inquiry regarding its origin and possible meaning.

In the first place "*Skinderviken*" is the name of a family homestead in Norway. This name is also borne by the members of the family pictured above, who inhabit "Skinderviken," Norway; seven of the family (all of whom are alive today) still residing there.

There is but one "Skinderviken" in the United States—Johan Skinderviken—the president and general manager of this company. It is curious to note that a letter addressed merely "J. Skinderviken, United States of America" has reached the addressee after a short delay.

To give your name to your business, especially where that name could not be applied to any other man in the country, is almost equivalent to ransoming your heart and soul. It means that your personal integrity and honor are bound to your business.

You see the necessity of square dealing—of honorable enterprise and our endeavor to secure satisfaction on your part.



PLEASE NOTICE

If battery manufacturers in the United States make and sell batteries worth four million dollars per year, to consume in magneto telephones equipped with bridge back transmitters, would it not shock you to know that the three million dollars is absolutely wasted, thrown away?

If you remove the bridge of the transmitter and put in a Skinderviken Transmitter Button, you will save 75% of the battery consumption. Would it not be pleasant to know that you would have helped save telephone users three million dollars per year?

Why do you not go ahead and do your share—throw the brake off, replace the old bridge and button with the Skinderviken Transmitter Button—that works as unhampered as a man in shirt sleeves?

Here are some valuable and money-saving hints: Do not use more than one dry cell for the button. Do not do as some "Managers," they put the button in the operator's head set and use up to 5 or 6 dry cells. They have complained to us that the button nearly breaks the ear drums of the operators and the party at the other end, or that the button has a rumbling sound. Take a rifle and fill it to the muzzle with gun powder instead of with the regular loading and it will surely make an unusual rumbling sound too. Use only one or two dry cells!

Send for latest bulletins and price lists of rebuilt telephone equipment.

SKINDERVIKEN TELEPHONE EQUIPMENT CO.

2134-36 N. Clark Street, Chicago, Ill.

Record of Telephone Patents

1,284,206. November 12, 1918; filed April 24, 1917. CALLING DEVICE; seven claims. E. W. Adams, East Orange, N. J.; assigned to Western Electric Co. In this calling device a dial switch is provided for sending trains of impulses while a set of keys modifies the character of the trains of impulses. Provision is made for operatively associating the keys with the dial switch.

1,284,242. November 12, 1918; filed August 25, 1914. SEMI-AUTOMATIC TELEPHONE SYSTEM; 12 claims. G. A. Yanochowski, Chicago; assigned to Automatic Electric Co. The feature of this automatic system is a registering device on the called lines. Means are controlled by an operator for transmitting a booster impulse over a trunk release circuit of the automatic switch to operate a relay in the trunk's release circuit. Means controlled by the operation of the relay transmit an impulse from a booster battery to cause the operation of the registering device.

1,284,274. November 12, 1918; filed March 27, 1908. COMMON BATTERY TELEPHONE EXCHANGE TRUNKING SYSTEM; 67 claims; J. Erickson, Chicago; assigned to Automatic Electric Co. A machine with a number of normally-open circuits controlled by line relays normally in bridge in each line at the central office has an idle switch connected to it when a subscriber calls in and is set in operation whenever the subscriber attempts to communicate with another subscriber. The circuits controlled by each subscriber's line relay are of such character and combined with operative means of such nature that the machine when set in operation will always transmit to the idle switch a call corresponding to the number of the calling subscriber. Each idle switch upon closing a connection to the calling subscriber's line, effects the energizing of the bridge cut-off relay belonging to such line.

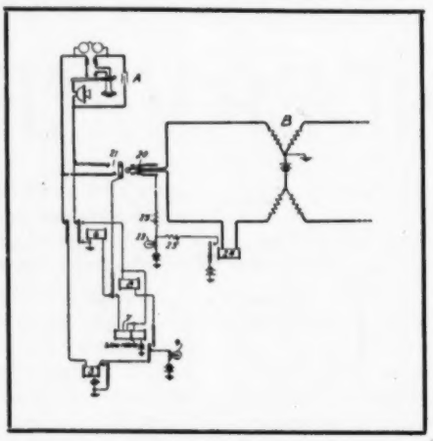
1,284,392. November 12, 1918; filed October 20, 1916. TELEPHONE SYSTEM; 13 claims; A. E. Lundell, New York; assigned to Western Electric Co. In this testing system provision is made for supplying current of the same polarity to the contacts of all test conductors which terminate in contacts on a switch. Means are controlled from a distant point for causing the switch to seize a particular outgoing line. A marginal relay is controlled over the test conductors for directly affecting the automatic operation and release of the switch.

1,284,418. November 12, 1918; filed October 18, 1917. TIME REGISTER FOR TELEPHONES; one claim; L. P. Montaney, Omak, Wash. A registering mechanism operated by a spring motor is so located in a telephone set as to be actuated by the raising of the receiver switchhook when the receiver is removed.

1,284,480. November 12, 1918; filed September 17, 1915; VIBRATOR; four claims; H. E. Shreeve, Milburn, N. J.; assigned to Western Electric Co. A variable resistance element is arranged to contact with a vibratory reed. Provision is made to vary the effective length of the reed so as to vary the frequency of its vibration, the vibrations of the reed serving to vary the resistance of the element which is adjustable relative to the reed.

1,284,533. November 12, 1918; filed September 24, 1914. TELEPHONE EXCHANGE SYSTEM; 11 claims; J. L. Wright, Cleveland, Ohio; assigned to Western Electric Co. In this semi-automatic system, line relays are adapted to close the driving circuit of a finder switch. Cut-off relays for the lines are connected to the fixed terminal of each line. Circuits for successively operating the cut-off relays are completed as the traveling contact of the finder switch wipes over the fixed terminals. A relay operated by the actuation of the cut-off relay of the calling line, is adapted to open the driving circuit of the finder switch.

1,284,623. November 12, 1918; filed February 1, 1918. TELEPHONIC RECORDING AND REPRODUCING APPARATUS; 10 claims; H. C. Egerton, Passaic, N. J.; assigned to Western Electric Co. This acoustic device has a member adapted to be secured to a phonograph for movement therewith relative to the photograph record. An E-shaped electromagnet is



No. 1,284,823.

mounted on and movable with a supporting member which is secured to the first member and movable perpendicularly to the direction of cut of the record. A stylus, carried directly by an armature mounted on and movable with the supporting member, is adapted to engage the record.

1,284,672. November 12, 1918; filed December 29, 1916. AUTOMATIC SWITCH; 15 claims; C. J. Hendrickson, New York City; assigned to Western Electric Co. In this switch an arm is arranged to engage one of a series of slots in the solenoid plunger rod and be moved therewith upon each energization of the solenoid. Provision is made to return the arm to its normal position upon each deenergization of the solenoid while a ratchet and pawl-mechanism maintains a brush-carrying shaft in an advanced position.

1,284,732. November 12, 1918; filed June 22, 1916. ELECTRICAL CONTROLLING SYSTEM; 10 claims; A. C. Magrath, Brooklyn, N. Y.; assigned to Western Electric Co. The feature of this automatic switch is the means, including a magnetic field, for applying a braking action to a movable shaft, such braking action being produced directly by the magnetism set up in the magnetic field.

1,284,742. November 12, 1918; filed August 29, 1916. AUTOMATIC SWITCH; six claims; J. L. McQuarrie, Montclair, N. J.; assigned to Western Electric Co. A single operating magnet mechanically controls the primary and tertiary selective movements of the movable shaft of this switch.

1,284,823. November 12, 1918; filed March 30, 1918. TELEPHONE SYSTEM; five claims; H. W. Ulrich, East Orange, N. J.; assigned to Western Electric Co. The feature of this system is a slow-release relay co-operating with the line relay to control the line signal. The energizing circuit for the slow-release relay is established upon the operation of the cut-off relay while a circuit, established upon the disconnection of the cord circuit from the telephone line, maintains the slow-release relay energized and the operating circuit of the cut-off relay open. A circuit, including a winding of the slow-release relay, is established upon the subsequent connection of the cord circuit with the telephone line for causing the closure of the operating circuit of the cut-off relay.

1,284,924. November 12, 1918; filed September 20 1913. AUTOMATIC PARTY LINE TELEPHONE SYSTEM; five claims; A. L. Piper, San Francisco, Cal.; assigned to Automatic Electric Co. Of two separate contact sets in the bank of the selector associated with the connector switch either may be included in the connection between a calling and a called line. A single relay in the connector determines which of a number of substations on the called line, is to be signalled after the connection is completed. A local energizing circuit for this relay is closed automatically by the selector when a particular one of the contact sets is seized during the establishment of the connection.

1,284,996. November 19, 1918; filed September 13, 1912. SEMI-AUTOMATIC TELEPHONE EXCHANGE SYSTEM; 109 claims; F. R. McBerty, London, Eng.; assigned to Western Electric Co. In this semi-automatic system a relay is provided for each operator's position and is rendered operable by means responsive to the unengaged condition of the corresponding position. Energizing circuits for all of the relays that are operable are closed in the operation of the connection extending means. Means are provided for selecting one of the operator's positions, the relay of which is operated.

1,285,196. November 19, 1918; filed May 3, 1917. SANITARY CLOSURE FOR TELEPHONE MOUTHPIECES; one claim; O. D. W. Inman, Beloit, Wis. The closure cap is arranged for being hingedly and detachably connected to the open end of a mouthpiece. Spring arms are carried by the inner face of the closure cap and hold between them a perforated cup containing a disinfectant which is adapted to project within the mouthpiece.

1,285,278. November 19, 1918; filed March 19, 1917. SPECIAL SERVICE SYSTEM FOR MACHINE TELEPHONE SWITCHING EXCHANGES; six claims; F. R. McBerty and L. Polinkowsky, London, Eng.; assigned to Western Electric Co. A special operator's position is provided in this automatic system and means responsive to the busy condition of a called line when a calling line has been extended thereto, extends the calling line to the special operator's position.

1,285,576. November 26, 1918; filed

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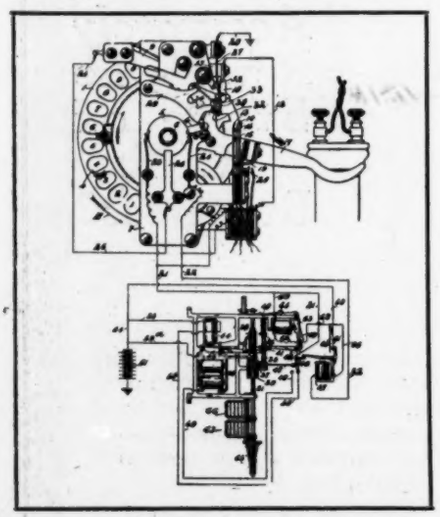
November 8, 1917. TELEPHONE SWITCHBOARD; six claims; C. C. Aller and O. Bekkedahl, Portal, N. D. A ringing relay for the cord circuit is operable, upon connection of the cord with a called line, to apply ringing current thereto. A self-locking relay through the windings of which current is supplied to a substation through the calling end of the cord circuit, is operable upon energization to disable the ringing relay. A locking circuit for the self-locking relay is maintained closed only during the connection of the link circuit with a called line.

1,285,969. November 25, 1918; filed January 24, 1916. TELEPHONE SYSTEM; nine claims; F. L. Fisher, Indianapolis, Ind.; assigned one-half to W. N. Boggess, Decatur, Ill. The feature of this system is a prepayment box having electrically-controlled means for positively moving a coin so that it will drop off of the supporting means and be included in the electrical circuit with the signaling mechanism. Provision is made for energizing the electrically-controlled means when the connection is established so as to remove the coin from the supporting means.

1,285,970. November 26, 1918; filed March 22, 1917. PREPAY BOX FOR TELEPHONES; nine claims; F. L. Fisher, Indianapolis, Ind.; assigned one-half to W. N. Boggess, Decatur, Ill. Electromagnets control the disposition of the coin as to returning it or depositing it. Interconnections are controlled by the coin-supporting means whereby the talking and listening instrumentalities are placed in series with one of the electromagnets while a coin is supported thereon. Slow-acting relays control the circuit through the coin-returned electromagnet.

1,286,131. November 26, 1918; filed August 14, 1914. TELEPHONE SYSTEM; 15 claims; F. M. Slough, Rochester, N. Y.; assigned to Stromberg-Carlson Telephone Mfg. Co. A cord circuit is provided at the central office for connecting all of the telephone lines together. Automatic ringing mechanism at the main office, nor-



No. 1,286,180.

mally disconnected from the telephone lines, has its connection to the called line controlled by a relay the circuit of which is controlled by the subscriber's talking set to automatically interrupt the talking strands of the cord circuits when the subscriber's talking set is restored to normal.

1,286,180. November 26, 1918; filed November 28, 1904. AUTOMATIC TELEPHONE EXCHANGE; 41 claims; A. E. Keith, Hinsdale, Ill., J. Erickson, and C. J. Erickson, Chicago; assigned to the Automatic Electric Co. The calling device at the subscriber's station has provision for changing the circuit with which it is connected, at each operation. The switching mechanism at the central exchange which is adapted to be connected with the telephone circuit, is restored to normal by the operation of a single releasing magnet.

1,286,855. December 3, 1918; filed September 4, 1915. SELECTOR SWITCH; 124 claims; H. G. Webster, Chicago. The switching devices of this switch are arranged in groups of two planes, the actuating means therefor comprising an operating element common to a group of devices in one plane. A multiple-controlling element is common to a number of groups of devices in another plane and multiple-operating links connect the multiple-controlling element with the operating element to actuate any desired switching device.

1,286,885. December 3, 1918; filed January 29, 1917. TELEPHONE RECEIVER; two claims; W. H. Riess, Cincinnati, Ohio. This telephone receiver is peculiarly shaped and weighted so as to render it capable of automatically assuming a position that the mouth end thereof will always be exposed when the receiver is laid down.

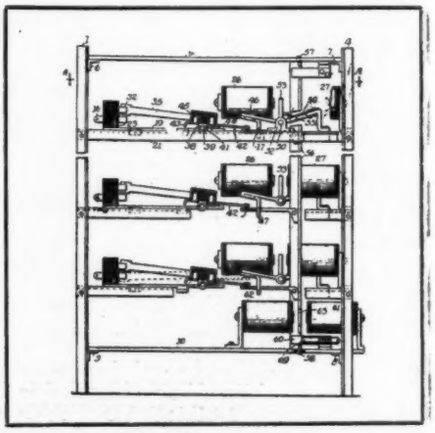
1,286,965. December 10, 1918; filed April 6, 1916. MAGNET CORE; seven claims; E. W. Elmen, Bogota, N. J.; assigned to Western Electric Co. A method of making a magnet core is described. It consists in producing iron electrolytically, grinding the iron into a finely-divided state, and then annealing the particles and coating them with insulating materials. A mass of the particles is then submitted to pressure sufficient to compress the mass into a self-sustaining solid.

1,286,966. December 10, 1918; filed February 21, 1916. TELEPHONE METER SERVICE SYSTEM; 17 claims; J. Erickson, Chicago; assigned to Automatic Electric Co. In this metered service system for automatic exchanges, the unitary meter structure comprises a register and a time mechanism with means for initially operating the register to thereby start the time mechanism. The latter controls means for producing additional operations of the register at intervals thereafter.

1,286,981. December 10, 1918; filed June 10, 1916. IMPULSE TRANSMITTER; five claims; W. H. D. Ford, New York; assigned to Western Electric Co. In this impulse transmitter a rotatable toothed wheel is carried by a driven shaft and normally-disengaged contact springs are brought into and out of engagement by the teeth of the wheel. A cam member is carried by the driving shaft and a lever is operated by it to move the contact springs out of operative relation to the toothed wheel and to maintain the contact springs in engagement during a portion of the travel of the toothed wheel.

1,286,982. December 10, 1918; filed December 29, 1916. CALLING DEVICE; four claims; O. F. Forsberg, Yonkers, N. Y.; assigned to Western Electric Co. In this calling device for attachment to the subscriber's instrument, a dial and a toothed wheel are rigidly secured to a rotatable shaft. A movable arm is arranged to engage an impulse wheel and the toothed wheel respectively, while a finger stop is arranged to limit the forward rotation of the dial to control the movable arm.

1,286,996. December 10, 1918; filed October 13, 1916. SELECTING SWITCH; seven claims; C. L. Goodrum, Brooklyn, N. Y., and J. A. Kropp, Oak Park, Ill.; assigned to Western Electric Co. In this selecting switch, an element carrying active contacts is mounted for movement in two directions. The brush-carrying element is operated in its several selecting move-



No. 1,286,855.

ments by a spring motor and provisions are made for controlling these movements and for restoring the element to normal position.

1,287,009. December 10, 1918; filed May 9, 1918. TELEPHONE EXCHANGE SYSTEM; 12 claims; W. H. Harrison, Brooklyn, N. Y.; assigned to Western Electric Co. Signaling between two switchboards is the feature of this patent. The cord circuit at the second switchboard, when connected to the trunk circuit between the two switchboards, operates means for disconnecting the signaling device from the trunk circuit. Switching means are responsive to the opening of the trunk circuit at the first switchboard to cooperate with the trunk circuit equipment for causing the operation of the signaling device.

1,287,064. December 10, 1918; filed April 13, 1917. TELEPHONE SYSTEM; four claims; J. L. McQuarrie, Montclair, N. J.; assigned to Western Electric Co. In this automatic system a device indicates the line with which the automatic switch is in engagement. This device is operated during the restoration of the switch.

1,287,079. December 10, 1918; filed December 31, 1915. AUTOMATIC TELEPHONE SYSTEM; 96 claims; F. N. Newforth, Chicago; assigned to Automatic Electric Co. A phantom circuit arrangement for automatic lines is described. A second circuit includes the first line while a third circuit includes the second line. A pair of condensers is placed in the phantom circuit at each end for preventing direct current flow between the line. A pair of coils for each of the condenser pairs is provided, the coils being in series with the batteries from which current is supplied and having their junction connected to the junction of the condensers. Controlling relays for automatic switches, accessible to the lines, are located in the second and third circuits.

1,287,101. December 10, 1918; filed August 1, 1917. METHOD OF MANUFACTURING MULTIPLE CONTACT STRIPS; 13 claims; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. The process of manufacturing the terminal strip of the preceding patent is described.

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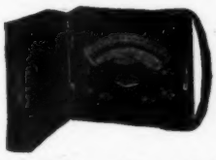

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1,287,099. December 10, 1918; filed March 20, 1917. ATTACHMENT FOR TELEPHONES; 20 claims; A. Reubenstone, New York. A registering device is described. It is included with apparatus which is connected with the transmitter for rendering it inoperative. Provision is made for renderng the transmitter operative and actuating the registering device.

1,287,100. December 10, 1918; filed November 9, 1916. TERMINAL STRIP; 13 claims; J. N. Reynolds, Greenwich, Conn.; assigned to Western Elertric Co. This multiple contact member for electric switches comprises a number of longitudinally-arranged parallel wires insulated from each other and grouped into sets. Each wire of each set has a displaced portion constituting a brush-contacting surface, the displaced portion of the wires constituting a set longitudinally separated from each other, while the displaced portion of the corresponding wires of the different sets are in the same transverse line of the member.

1,287,161. December 10, 1918; filed August 30, 1916. VACUUM TUBE VOLTMETER; seven claims; R. H. Wilson, East Orange, N. J.; assigned to Western Electric Co. This method of measuring an electrical quantity consists in comparing the electrical values necessary to produce the same finite resultant space current, both when the space current is influenced and when not influenced by the electrical quantity to be measured.

14,572 (Reissue Original Patent No. 1,169,422 January 25, 1916) December 17, 1918. THERMIONIC REPEATER; 51 claims; A. McL. Nicholson, New York; assigned to American Telephone & Telegraph Co. This space current device comprises a number of electrodes one of which is insulatingly supported by another electrode.

OPPORTUNITIES (Continued From Page 43)

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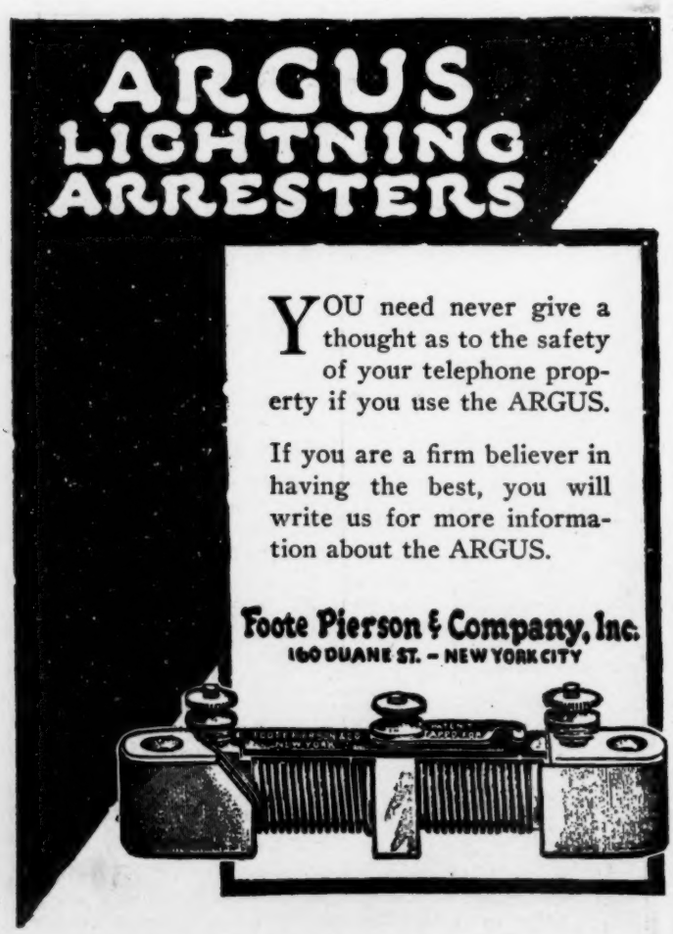
WANTED—Position as manager of exchange of 2,000 to 10,000 subscribers; 20 years' experience in all branches of the business, particularly traffic. Address 3596, care of TELEPHONY.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